

THE BOSTON Medical and Surgical JOURNAL

VOLUME 192

FEBRUARY 19, 1925

NUMBER 8

ORIGINAL ARTICLES

X-RAY AND RADIUM THERAPY IN UROLOGY

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[From the Huntington Memorial Hospital]

ANY discussion of the place of radiation in a specialty such as urology, in which widely varying types of pathological lesions occur, necessitates a recognition of the different forms in which radiation may be employed. It may not be amiss, therefore, to review briefly the physics of radium and the roentgen ray, and to establish first a clear conception of the different ways in which these measures may be used.

At the Huntington Memorial Hospital the total supply of radium is kept in solution in a flask. From the solution of radium a gas is constantly being given off; this gas is purified and led into a glass capillary tube less than a millimeter in diameter. Different lengths of this tube, with varying quantities of the gas imprisoned within each segment, are sealed off by heat. The gas is radium emanation; it contains solid particles of Radium A, Radium B and Radium C. From these substances are given off the different kinds of rays. The emanation therefore has the radioactive property of radium, and supplies the same source of Beta and Gamma rays as does the element Radium; the difference lies in its vastly greater rapidity of disintegration. Emanation loses 50% of its potency every 3.85 days, whereas radium itself loses one half its radioactivity in something under 1760 years. For practical purposes, the emanation is the better form in which to employ the radioactive principle, because it is more capable of subdivision into very minute quantities. It is, we may say, more flexible, and the danger of losing the source of our radioactivity is done away with. The maximum amount of emanation accumulated from 1 milligram of radium over a considerable period of time is termed a millicurie.

From the radium emanation and its products are given off three kinds of "rays." The Alpha rays are positively charged material particles, really helium atoms, liberated from the radioactive substances with an initial velocity of 9000-12000 miles per second. These rays, since they are absorbed by the thinnest layer of metal or by a sheet of note paper, never get beyond the glass which contains the emanation. Con-

sequently they are of no practical interest when radium is used in any sort of container.

Beta rays are negatively charged electrons of varying degrees of penetration. The softest Beta rays approximate the Alpha rays; the hardest or swiftest have one hundred times the penetrating power of Alpha rays. Yet even the hardest Beta rays are absorbed to a large extent by 1 centimeter of epithelial tissue. To get any effect from these rays, therefore, the source of radiation must be applied closely to the tissues upon which an effect is desired.

Gamma rays are not particles or electrons, but are undulations of the ether, or electromagnetic waves, similar to X-Rays but of shorter wave length and consequently of greater penetration. An idea of their penetrating power is given by the fact that the hardest Gamma rays will penetrate even a foot of lead without being entirely absorbed.

X-Rays are similar in character to these Gamma rays, as has been stated. The rays produced by the ordinary low voltage machine (90,000 volts) are of somewhat longer wave length, and are absorbed more easily and penetrate less deeply. The rays from the recently devised high voltage machine (140-200,000 volts) are of shorter wave length than those from the machines of lower voltage, and penetrate to a greater depth.

Both Gamma rays and X-Rays follow the law that the amount of energy received at any given point varies inversely as the square of the distance between that point and the source of the rays; this law does not take into consideration the absorption of the rays by the tissues through which they pass.

To summarize, we have two widely different forms of radiation. One involves the use of the Beta rays, which do not penetrate much more than one centimeter. Within that radius, these rays are very powerful, being eight times as active as the Gamma rays given off at the same source. To secure the services of the Beta rays, one must employ unscreened or slightly filtered radium emanation or element, and must apply the source of the rays closely to the tissues to be treated. This method of using radium

is confined to surface growths, such as the superficial epitheliomata of the penis, or the tumors in which the unscreened radium can be buried.

Stevenson of Dublin in 1915 first used radium by implantation; the element was contained in steel needles which were plunged into the center of the tumor and removed after a few hours. Duane of the Huntington Hospital, who devised the apparatus for collecting emanation, modified this method by burying tiny ampules of emanation of one or a few millicuries each within the growth; these ampules or "seeds" become inert by the end of one week, and are thrown off with the slough which results from their activity. When a number of such seeds are buried in a tumor, each seed produces an oval shaped area of necrosis about 1 cm. in diameter. In addition to this local, necrotizing effect, there is also considerable effect produced by the action of the Gamma rays from the whole number of seeds; this action is more widespread than that of the Beta rays.

When it is desired to radiate a tumor lying beneath healthy tissue, an entirely different problem is presented. We aim then to pass rays into the tumor in sufficient strength to exert a therapeutic effect, yet the rays must not be powerful enough to destroy the intervening healthy tissue. The accomplishment of this object would be impossible if it were not for the fact that tumor tissue is more susceptible to radiation than is normal tissue and can be radiated through different areas of normal tissue; by this means the tumor receives radiation with every treatment whereas each section of overlying tissue receives radiation but once. This phase of the question will be taken up a little later. It should be clear that in the employment of radium for such a purpose—namely, the radiation of deep-lying tumors,—the Beta rays must be filtered out and only the Gamma rays used. This end is gained by the enclosure of the source of radiation within a capsule of lead, platinum, silver or other metal thick enough to filter out the rays that are not wanted.

Silver screens of 0.1 mm. thickness absorb 50% of the Beta rays.

Silver screens of 0.5 mm. thickness absorb 96% of the Beta rays.

Silver screens of 1.0 mm. thickness absorb 99% of the Beta rays.

Silver screens of 2.0 mm. thickness absorb 100% of the Beta rays.

Since, by the impaction of rays upon the filter, a few secondary Beta rays are formed, the whole apparatus should be separated from the surface of the body by six to ten centimeters of air, or by gauze or rubber placed about it to prevent the metal screen from touching the skin.

Inasmuch as the Gamma rays constitute only a small percentage of the radiation much larger

amounts have to be employed in order to get any effect. 2000 to 4000 mc. hours are given at one exposure. Such treatments are known as radium packs. Since the introduction of the high voltage X-Ray machine, X-Ray treatments have largely superseded these radium packs, thereby releasing large quantities of radium for those purposes for which the X-Ray could not be used.

The effect of radiation upon living tissues opens a very interesting and still undecided question. Ewing² says that "changes occurring under radiation are not duplicated under any other conditions and indicate a specific and selective action of radium upon tumor cells." That this action is frequently not the same in apparently similar tumors in different individuals must be admitted. The caustic action of the Beta rays is so intense that all tissues, both normal and malignant, undergo complete necrosis when exposed for a comparatively short time. When deep radiation is employed, however, either by means of the radium pack or X-Ray, there is great difference in the degree to which apparently similar tumors respond, and also in the amount of reaction shown by the individual who is radiated.

Ewing believes that tumors of embryonic type, such as testicular tumors, are much more susceptible than those of the adult-celled type, such as squamous carcinomata. Very cellular, rapidly growing tumors of any type are more susceptible than the slower growing scirrhous forms. The portion of the cell first affected is the nucleus; this part is especially vulnerable while in process of cell division. There is still much controversy as to whether a deep-lying tumor can be killed by radiation which has to penetrate several inches of healthy tissue before it reaches the growth. Certain German roentgenologists have formulated a theory of a "killing dose" for carcinoma and another for sarcoma; the former consists of a dose which is 90-110% of the erythema dose, whereas the sarcoma dose is somewhat less. Not infrequently the "killing dose" for the carcinoma is a killing dose for the patient. Ewing believes that we cannot expect to kill a cancer by external radiation; it is necessary, he thinks, to employ the caustic action of the radium by exposing the tumor and implanting in it unscreened radium. Metastases of certain types, however, may be pretty effectually destroyed by external radiation.

The beneficial effects of deep radiation Ewing believes are due chiefly to interference with the circulation of the tumor. The endothelial cells of the blood and lymph vessels are especially susceptible to radiation; the destruction of the circulation of blood and lymph prevents the tumor cells from getting nourishment and interferes with the carrying away of waste products. In support of this theory Ewing describes deep lying tumors in which, after radiation, the cen-

ter became necrotic, while healthy cancer cells were found in the periphery. There is also a stimulation of connective tissue formation; this prevents extension of the growth, and even if individual cells survive, they become enmeshed in connective tissue. Ewing insists that we must employ radiation *secundum naturam*; a cachectic individual will not respond to radiation under any circumstances. He believes that by slow disintegration of the tumor through circulatory interference substances are liberated which increase the patient's resistance. For these reasons, he is opposed to the theory of a killing dose, and says that excellent results have been obtained in the Memorial Hospital, New York, by means of low voltage X-Ray treatments, given frequently.

This is a brief outline of the *rationale* of radiation, and of the factors which must be considered before one decides upon the proper method of radiation therapy for any particular tumor.

In urology ample opportunity is given for the employment of all types of radiation. Let me mention its possible uses, with a few illustrations.

We will begin with the less serious and more superficial conditions. Radiation in urology is employed only in cases of malignant disease, with one exception. The exception is the clinical entity known as *fibrosis of the corpora cavernosa*. This condition is due to the formation in the shaft of the penis of areas of dense connective tissue, almost cartilaginous in consistency. These areas sometimes give rise to pain, especially during erection. The etiology is sometimes luetic, sometimes traumatic, sometimes unknown. In the small series of 6 cases which we have treated at the Huntington Hospital the Wasserman was negative in four, not taken in two. Three cases had a definite history of injury, such as striking the penis against some sharp edged piece of furniture. In all of the six cases, symptomatic relief followed one or more applications of radium. As to the induration itself, the result in one case is unknown; in one, the induration was not diminished although the pain had disappeared; in 3, the area of fibrosis became definitely less, and in one case it practically disappeared.

Justification for the use of radium in the above condition may be found in the statement of Simpson (page 82) who quotes Thies as saying that white fibrous connective tissue, when exposed to the rays, underwent destruction. Yellow elastic fibres, however, are resistant to radiation. Ewing also says that a cessation of activity of proliferating connective tissue is often produced by radiation. In treating fibrosis of the penis, we have depended largely upon Gamma radiation, for fear of causing ulceration of the skin by the Beta rays. Two or three needles of emanation, screened by 1 or 2 mm. silver and 0.5 cm. gauze, are fastened to the

penis by adhesive plaster in such a way as to subject the area of fibrosis to a cross-fire. A total dosage of 200 mc. hours of radium so screened has caused moderate erythema and occasionally superficial ulceration of no importance. Consequently the application should be no greater than this. The treatments may be repeated every six weeks or two months.

Epithelioma of the Penis: Early cases of this type of malignancy are well suited for radium treatment. Careful selection of the cases must be made, however. Frequently preliminary circumcision is necessary. If the growth is then seen to involve only the superficial structures of the glans penis, it should be radiated. If it appears to have broken through the fibrous covering of the glans, and invaded the blood spaces beneath, amputation should be done. Of the 7 cases in which we believed radium justifiable, in none have metastases in the groins appeared. All have responded to radium treatment. Three have entirely healed, so that the glans penis shows no suspicious areas. In four, some sort of lesion persists, either a radium ulceration or a small area of crusting which may perfectly well be due to radiation, but which necessitates occasional visits to the hospital for observation. The earlier cases were treated too heavily, with the result that rather deep ulcerations were produced which were covered with a dry, fibrous, persistent slough. In the treatment of these growths, the caustic effect of the Beta rays is desired. Unscreened needles are applied over the affected area. We have found that from 7-10 mc. hours will suffice to cause a superficial slough which removes the growth without destroying too deeply the underlying tissue. This dosage is best given by applying a fairly heavy dose for a few minutes, rather than a small dose for a longer period. 100 millicuries for 10 minutes, for example, produces about the right amount of reaction.

In more advanced cases, the question arises as to the value of radiation following amputation. In the very limited experience we have had with such cases, radiation has not accomplished much. For example, a man of 59 had complete emasculation and dissection of the groins on September 30, 1922. The glands from both groins showed invasion by the growth. In December of the same year he had two $\frac{1}{2}$ erythema doses at 170 kilo volts (a fairly high voltage), but he died in June, 1923, of "metastatic carcinoma of bladder." (Town clerk's report.) Another man had a partial amputation of the penis for epidermoid carcinoma in June, 1924. The groins were not dissected, as there appeared to be no involvement of the glands. He was given three X-Ray treatments at lower voltage (120 K V) on July 9th, September 12th, October 6th. In spite of this a mass of glands developed in the left groin. This mass was removed surgically in November.

Microscopic examination showed a large amount of connective tissue stroma thickly strewn with large oval, rather vacuolated nuclei. These were not arranged in the manner typical of epidermoid cancer, and their appearance suggested sarcoma rather than carcinoma. They appeared to be healthy enough, however, in spite of the radiation.

Tumor of the Testicle: There can be no question as to the proper treatment for the primary tumor. Orchidectomy should be done as soon as the diagnosis can be made. Unfortunately metastasis in these cases is early. The growth recurs in the glands that lie along the iliac artery and the aorta. Hinman, aroused by the poor results of simple orchidectomy, advised careful dissection of the lymphatics from the renal vein to the inguinal ring. In some cases so extensive an operation is unwise, or may be thought unnecessary because of the early discovery of the tumor. In such cases, deep radiation of the abdomen is worth while for it is well known that the metastases of these tumors are especially susceptible to radiation. We have had one very encouraging case of this sort at the Huntington Hospital.

J. E. age 27, came to the clinic in December, 1921. He had been operated by his doctor for tumor of the testicle, and presented a scar in the left groin and a mass of glands three inches in diameter on the inner wall of the left pelvis. The left testis was absent from the scrotum. His doctor did not state in his letter that he had not removed the testicle, so, seeing that the gland was missing, it never occurred to me that orchidectomy had not been done. We therefore started to radiate the metastases.

December 17, 1921, the patient was given a radium pack of 3804 mc. hours over the left groin.

January 12, 1922, the mass had decreased to one-third its original size. Another radium pack of 3216 mc. hours was given.

February 9. The mass had entirely disappeared. Weight 115½ lbs.

In March I learned from the patient that his testicle had always been intra-abdominal, and that it had not been removed. On March 2, therefore, an operation was done and a malignant testicle only about twice the size of a normal gland was removed together with several enlarged iliac glands. Microscopic examination of the testis showed embryonal carcinoma. Through an opening in the peritoneum could be felt masses of enlarged glands extending as high as the renal pedicle. These were not disturbed. The patient was given three X-Ray treatments by Dr. L. B. Morrison. In June, 1922, he was given a high voltage treatment at the Huntington Hospital, but collapsed while it was going on. Later treatments were therefore given by means of radium packs. In October and again in November, 1922, he was given 2100 mc. hours over the upper abdomen.

In March, 1923, he had lost 6 pounds, complained of pain in the upper lumbar region, and on deep palpation a mass could be felt in the upper left quadrant. He was given 2640 mc. hours over that area.

In May, July and October, 1923, he was given similar treatments of about 2700 mc. hours each. In April, 1924, he was given 1800 mc. hours over the left groin, where a small mass was palpable beneath the scar. November 23, 1924, he appeared to be well. Weight 115. Color excellent. Digestion good. No subjective symptoms. No masses palpable in abdomen. Lungs resonant. No enlargement of palpable glands.

It can hardly be expected that kidney tumor will respond to deep radiation. The circulation is so free and the tumor usually so bulky that nephrectomy should be done whenever possible. After that, X-Ray treatments may be given in the hope that metastases may be destroyed or restrained. The metastases of hypernephroma, however, are so widely disseminated that there is little chance of accomplishing anything important by radiation.

The embryonic renal tumors of childhood should yield more satisfactory results. Ewing says that he has seen regression of such a tumor follow ¼ of an erythema dose. This was attended by collapse of the infant, so we must be cautious in the employment of radiation in these cases.

Tumors of the Bladder: The proper measures to employ in these cases depend so much upon the type and situation of the growth that no sweeping recommendations can be made. Benign papillomata yield well to fulguration through the cystoscope, and do not tend to recur any more frequently after this treatment than after excision. Other growths so situated that excision may be satisfactorily performed should be removed, but in at least half the cancers encountered, the growth is either so situated that resection entails too extensive an operation, or has progressed so far that resection would obviously be inadequate. For such cases cystotomy, removal of the fungating portion of the growth by means of the cautery or diathermy, followed by implantation of seeds or of radium needles of small potency, will usually give excellent results. There is of course a limit to the size of the area which can be so treated. If a section of bladder wall more than 4 cm. in diameter is involved, there is little use in trying to check the growth. The chances are that it is already outside the bladder. We have had a number of very encouraging cases treated by the implantation of seeds.

The case which has gone longest without recurrence is T. D., age 43. November 3, 1921. On November 9th of that year cystotomy was done. Into a sessile growth about 2 cm. in diameter, involving the right ureteral orifice, 10 seeds totalling 27 mc. were implanted. A

specimen removed at the time was reported "Carcinoma." Jan. 1925, examination by cystoscope and external palpation showed no sign of growth. The patient had gained much weight and considered himself well.

In other cases the growth has apparently been destroyed, but the time elapsed since operation is too short to report them even as probable cures.

Another use for Radium in cancer of the bladder is in meeting local recurrences as they arise. Through the cystoscope one or two seeds can be implanted in early recurrences. One seed will destroy a tumor a cm. in diameter. By keeping after these cases some of them can be carried along in comfort for a number of years.

Cancer of the Prostate: In my own experience these cases fall into one of two groups. Either they are suitable for total prostatectomy, usually with vesiculectomy, an operation which I have done upon 15 cases with no operative mortality* and with most satisfactory results, or they are inoperable. Contraindications for operation are: cachexia, definite metastases, usually demonstrable by X-Ray in spine or pelvis, invasion of the trigone by the growth, or extension of the growth onto the pelvic wall. The cases which I have treated by total excision in certain clinics would have been radiated. At the Mayo Clinic, for instance, Radium is applied from the urethral surface, the rectal surface, and by inserting needles bearing it into the gland itself. Barringer of New York favors the latter method. I have yet to be shown why total prostatectomy as originally performed by Hugh Young is not preferable to these slower and less certain methods. If spinal metastases occur, the pain which they cause can usually be controlled by X-Ray.

For the inoperable cases, which are usually far advanced, X-Ray may be tried. At the Huntington Hospital we have used the high voltage machine on seven cases. Usually a course of treatments consists of four half erythema doses given on successive days. The target distance is usually set at 80 centimeters, the Kilo voltage is 170, the filter is 0.5 millimeters copper and the current 3 milliamperes. Sacral and suprapubic regions are exposed on alternate days. 1200 electro static unit seconds is regarded as the standard erythema dose.

(1) E. H. 66. X-Rays showed invasion of the rami of the pubic bone. 4 exposures in April, 1924. Died October 30, 1924.

(2) G. L. 72. July 12, 1922, was given an erythema dose. $\frac{1}{2}$ anterior, $\frac{1}{2}$ posterior. August 3. Glands in groin smaller. Patient

*One of these cases died while still in the hospital, three months after operation. The growth had invaded the left vesicle so extensively that I could not remove it, so radiated the area. The patient did well at first, but about one month after operation he began to lose ground and grew progressively weaker.

able to empty bladder. Went into coma and died.

(3) R. P. 56. Mass of glands 3 inches thick inside left pelvic wall. Great edema left leg. Takes morphia for pain. Prostate typically malignant. Weight 111 pounds. January 23 and 24, 1923, erythema dose over sacrum and one over pubes. March 20 and 21, one-half erythema dose over sacrum and $\frac{1}{2}$ over pubes. June 6, 1923. Has been working for 3 weeks. Weight 130 pounds. Mass in pelvis partially gone. No need for morphia now. June 25 and 26. Two more $\frac{1}{2}$ doses. October 31, 1923. Recently has failed and lost 20 pounds. X-Rays show metastases in cervical and thoracic vertebrae. Died Jan. 15, 1924. This patient showed remarkable improvement for a time.

(4) McD. 54. Patient had total prostatectomy in May, 1922. Growth recurred about trigone a year later. June, 1923, had 4 half erythema doses. October 4, 1923. No marked change. Growth feels softer on rectal examination and patient empties bladder completely. December 6, 1923. Cystoscopy: Base of bladder covered with growth. Died July, 1924. Very little help, if any, from his radiation.

(5) P. S. 65. September 26, 1923. Extensive carcinoma prostate with involvement of sacrum and inguinal glands. X-Rayed to stop pain. Eight half erythema doses over a period of 3 months. Glands in groin disappeared. Prostate felt softer. Pain was completely relieved, but new pains from new metastases developed. Died July, 1924.

(6) W. M. 69. April, 1924. Cystoscopy showed invasion of trigone. Growth apparently limited to prostate, vesicles and trigone. April, 1924—four $\frac{1}{2}$ erythema doses. Repeated in July. Although he gained 9 pounds in weight, his prostate in August, 1924, felt the same as before treatment. His doctor reports (Dec. 6) he has been more comfortable since his radiation, but that the disease is progressing. He has had no vesical or rectal symptoms, but has pain apparently from spinal metastases.

(7) T. H. 55. Laborer. May 17, 1923. Cachectic man. Symptoms of 1 yr. duration. To inner side of each Poupart's Ligament is a round mass size of tennis ball. Chain of glands along left iliac vessel. Prostate hard; induration in vesicles. Cystoscopy shows 4 oz. residuum. Prostatic outline irregular, with nodules and masses projecting. On base of bladder is one discrete round tumor.

June 20-21-23. One-half erythema dose—170 K. V. on each of three successive days. No ill after effects.

Nov. 15, 1923. For three months pt. was in bed with swelling of left leg. For two weeks has been at work. No bladder symptoms. Gain of 15 pounds. Mass in right pelvis is one-fourth the size it was. Even less inside of left

Poupart. Suggestion of enlarged glands along aorta. Rectal: induration higher than finger can reach. Prostate is flat and softer than a malignant gland. Cystoscopy: No residuum. Prostatic outline only slightly prominent. Smooth except on upper quadrant where mucosa is irregular. One small nodule on trigone. Advised to have more X-Ray but did not come in.

March 6, 1924. Has been working. Weight 195, a gain of 12 pounds. Urine clear. Rectal: Prostate feels soft and not at all suggestive of malignancy. Above prostate bladder base feels firmer than usual. Cystoscopy: Prostate appears prominent, more like adenoma than carcinoma. Just above anterior commissure is a nodule in the bladder wall. Trigone—clear! Abdomen: mass inside of left ilium is barely palpable. No other glands felt.

April 14-15-16-17. X-Rays. No reaction. $\frac{1}{4}$ erythema dose each day.

June 5. Feels well—no pain. No trouble voiding. Nocturia 1-2. Prostate large, elastic, movable, no suggestion of carcinoma. No masses in abdomen. Cystoscopy: Prostate prominent, like adenoma. No masses elsewhere in bladder. Sloughing area in roof has disappeared.

November 27, 1924. Patient is feeling well and working full time. Only complaint is slight burning on urination. Color good. Weight normal. Abdominal examination shows no masses. Rectal examination: prostate large and elastic, not at all suggestive of malignancy. Cystoscopy: Urine slightly hazy. 1 oz. residuum. Prostate shows enlargement of the lateral lobes, the appearance being typical of a benign hypertrophy. There are no sloughing areas and no tumors seen anywhere in the bladder.

The recital of this case, to me a very remarkable one, closes the very short series of clinical observations on this subject.

In estimating the value of radiation in urology I would agree with Ewing's statement that

while radiation of deep lying tumors may relieve pain and restrain their growth, it rarely cures. As an adjuvant to surgical removal, deep radiation is a rational measure to employ, for it may restrain early metastases.

In a large proportion of cases of carcinoma of prostate and bladder, especially of the former, metastasis to the spine has already taken place before the diagnosis is made. We cannot expect radiation of the pelvis to check growth in the dorsal vertebrae, nor is it possible to radiate the entire body with a view to checking such metastases. We can only wait for them to develop, but when they do begin to cause pain, the suffering can be greatly relieved by appropriate radiation.

In cases where it is inadvisable for any reason to remove the growth, such as early cancer of the penis or certain cancers of the bladder, the direct attack upon the tumor, using both Gamma and Beta radiation to slough out the pathological area, is a most satisfactory procedure, and one which may be attended by cure, provided metastasis has not already taken place.

In short, there is place for radiation of the deeply penetrating type or of the locally caustic type in the majority of cases of malignant diseases of the genito-urinary tract. It may also be used with a fair measure of success in one condition which is not due to malignancy—namely, fibrosis of the corpora cavernosa. As regards the efficacy of deep radiation in controlling metastases, we have not yet sufficient information to enable us to know just how much it will accomplish. That it will check the development of many growths we have already discovered; it will require much more extensive observation before we can estimate with accuracy the value of radiation in this field.

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THE TREATMENT OF SYPHILIS WITH BISMUTH*

BY J. L. GRUND, M.D.

THE protean character and the diverse manifestations of syphilis are such that the advent of a new drug, presenting an added avenue of attack, is as a rule, a welcome addition to the definitely furnished armamentarium of modern anti-syphilitic therapy. Since its introduction, bismuth has demonstrated itself, following scrupulous investigation both abroad and in this country, to be of definite potency in the subjection of syphilis in experimental animals and in humans. In the great majority of instances, it has been used exclusive of any other form of

therapy; and the very favorable end results obtained naturally raise certain points of interrogation. Is bismuth to supplant the drugs at present in vogue? Is it to be used only as an adjunct to the arsenicals and mercurials? Or is it to be used only in certain contingencies which may arise in the course of a case of syphilis? With the immediate foregoing in view, the results obtained in a considerable series of cases presenting syphilis in its various stages, will be portrayed.

The first experiments with bismuth by Balzer¹ carried out on dogs were devoid of any particular significance because of the development of

*From the Department of Dermatology and Syphilis, Boston Dispensary.

severe stomatitis and enteritis, necessitating an early cessation of his studies.

No further work was attempted until as late as 1916, when Sauton and Robert² studied the spirilloidal effect of sodium tartrobismuthate on hens infected with *Spirochaete gallinarum*. The results obtained were of such satisfactory nature that the work was extended to subjects with recurrent fever and syphilis. The untimely death of Sauton and the presence of war prevented the progress of experiments which were really of fundamental importance as a basis for the future role of bismuth in the therapy of syphilis.

In 1920, 1921 and 1922, Sazerac and Levaditi^{3, 4, 5} reported favorable results in experimental rabbit syphilis and in trypanosomiasis. Using sodium and potassium bismuth tartrate, they demonstrated that 0.05 gram per kilo body weight, a sub-lethal dose for rabbits, was curative and sterilizing.

The latter work was confirmed and elaborated upon by Fournier and Guenot⁶ who employed the same drug and in a similar manner, namely by intramuscular administration, in the treatment of some 200 patients suffering from syphilis in some stage of its various manifestations. These authors conclusively prove that bismuth is of definite potent spirocheticidal value as evidenced by the rapid disappearance of spirochaetes from specific lesions after several injections of the drug, and a rapid detergescence of the signs and symptoms present in the secondary and tertiary stages of syphilis. In the great majority of patients the degree of positivity of the serum Wasserman reaction was reduced, and in some changed to the negative phase and maintained as such.

Among other early observers, Nicolas, Massia and Gate⁷ consider bismuth superior to the mercurials. Following the use of various compounds of bismuth, Greco and Muschiatti⁸ conclude that though possessing a definite curative action on specific lesions, bismuth could not replace the arsenicals or mercurials at present in use.

Using the compound of bismuth hydroxide, Fourcade et al⁹ report a rapidly curative action on clinical lesions, and in some cases a satisfactory modification of the Wasserman reaction. No effect on the spinal fluid Wasserman was noted.

Lévy-Bing¹⁰, Milian¹¹, Covisa¹², Jeanselme et al¹³, Azoulay¹⁴, Müller¹⁵ and Carle¹⁶ report gratifying results with bismuth and consider it of decided value in the treatment of syphilis. Schreus¹⁷ reports results obtained in 22 cases of syphilis, 18 of which were treated with bismuth alone and the remaining 4 with arsphenamine and bismuth. His conclusions indicate that the therapeutic action of bismuth, though slower than that of salvarsan, is far greater than that obtained with mercury.

In this country, Pardo-Castello¹⁸, using bismuth solely, and treating 9 patients, each presenting either primary, secondary or tertiary cutaneous syphilis, obtained at the end of one course, involution of the lesions in every instance, a negative Wasserman test in 7, and a positive in 1. His drug of choice was quinine bismuth iodide, which he considers less liable to cause pain when injected intramuscularly, and less liable to induce a stomatitis. In a comprehensive work, Klander¹⁹ seconds the findings of Levaditi and considers bismuth as possessing definite power in subjecting clinical and serological syphilis in its various stages. In addition, he recommends its administration in certain selected instances, in which subjects undergoing treatment, act in a refractory manner to the arsenicals. Further data as to the advantageous results accruing from the use of this drug is evidenced in the reports of Hopkins²⁰, McCafferty²¹, Raiziss et al²².

Considering its use in neurosyphilis, Mueller²³ reports a definite decrease of the pleocytosis as well as a distinctly beneficial effect on the symptoms usually present in this phase of the disorder. He ascribes the preceding to an ample amount of bismuth detected in the spinal fluid. Cébrian²⁴ maintains that it may be administered with desired results because of its ability to permeate the meninges and thus directly affect the nervous system. In a recent study of more than 90 cases of general paresis, Marie and Kohen²⁵ attach to bismuth a greater capacity for the penetration of the nerve centers in comparison with the arsphenamines and the mercurials.

Thus, if all the foregoing reports are to be accepted at their face value, bismuth must be accorded a definite place in the present day treatment of syphilis. And it is hoped that light may be added to the extent in which bismuth may be used in the subjection of the variegated manifestations of this disease. During the past sixteen months, 109 cases of syphilis at the Boston Dispensary underwent treatment with bismuth and its effects, both advantageous and deleterious, were closely scrutinized. With the exception of a small number of early cases in which it was substituted for mercury as an adjunct to arsphenamine in the intensive treatment, bismuth was employed in a conservative manner in that its administration was the sole alternative following the failure of older and more tried methods. The majority of patients was made up of those usually placed in the category of latent Wassermann-fast syphilis, the remainder consisting of those presenting a definite untoward sensitivity toward the arsenicals, or in whom, the type of syphilis present contraindicated the introduction of either neoarsphenamine, sulpharsphenamine or arsphenamine in a dose usually considered of therapeutic value.

THE CLINICAL APPLICATION OF BISMUTH

In the present study, the form of bismuth used, was an oil suspension of potassium bismuth tartrate, a compound having been recently reported by Klauder²⁶ as possessing a greater therapeutic index than sodium and potassium tartrobismuthate, both in aqueous solution and in oil suspension, and than bismuth trioxid. Since intravenous administration as demonstrated by animal experimentation has proved to be positively contraindicated because of its fatal toxicity, and since bismuth applied in the form of inunctions has been demonstrated to be of a lower spirochaetal value than a corresponding preparation of mercury, the sole method of introducing the drug in question was by the intramuscular route. It was introduced deep into the gluteal region in the same manner as mercury, care being taken that no bismuth was left behind in the subcutaneous tissues, an event which would almost invariably result in the formation of a painful sterile abscess.

Fournier and Guenot⁶ advise a course of treatment totalling 2 to 3 grams administered in 10 to 12 injections during a period of one month. This necessitates an average of three injections a week, a method of procedure which has proved in other hands to be too drastic, the rapid accumulation of the drug in the body and its relatively slow elimination often culminating in signs and symptoms of bismuth intoxication.

Because of the long drawn out character of treatment in syphilis, the average dispensary patient is either very reluctant or finds it practically impossible to attend the clinic more than once in seven days. Thus, with the exception of a small quota who received two treatments a week and a group of ostensibly sensitive subjects in whom it was thought that the initial dose should not be beyond 0.1 gram, 0.2 gram potassium bismuth tartrate containing 64-69% metallic bismuth was introduced once every seven days until a total of 3.0 grams of the drug was obtained, when the patient was ordered a rest of one month to six weeks without partaking of any form of medication. Following this interim, a blood Wassermann test was obtained and a repetition of the treatment instituted until a persistently negative serum Wassermann reaction was maintained. With this method the occurrence of untoward reactions due to a large and rapid accumulation of bismuth in the organism was for the most part avoided.

DISTRIBUTION AND ELIMINATION OF BISMUTH

Experimental animal studies²⁷ indicate that bismuth injected intramuscularly is subsequently found in the brain, salivary glands, liver, spleen and kidneys. Its elimination is accomplished in the sweat, milk, bile, urine and feces. In the urine it appears from 18 to 24

hours following its introduction; and it has been detected from 20 to 25 days following the cessation of an administration totalling 2 to 2.5 grams.

Röntgenologic examinations at the site of injection prove that bismuth remains for some time in the gluteal muscles exerting thereby, a prolonged antisyphilitic effect. This phenomenon illuminates certain cases of the writer's series, in which cases manifesting a positive Wassermann reaction immediately after the culmination of a series of injections, turned negative after an interim of one month in which no further treatment was given.

UNTOWARD REACTIONS WITH BISMUTH

Due to the conservative manner in which bismuth was administered, the number of reactions noted were relatively few and occurred in patients naturally sensitive to such a degree that a more intensive plan of treatment would undoubtedly have been followed by untoward symptoms much more lasting and severe. Whether or no, pigmentation of the gums is to be considered a danger signal is a question, for its universal presence in this series, very naturally minimized any apprehension as regards untoward symptoms which might have followed in its wake. However, pigmentation plus a foul breath should warrant immediate cessation of treatment which should not be resumed until the patient assumes a more normal status.

In a report on the untoward manifestations encountered in their work, Milian and Perin²⁸ present certain interesting statistics; 56% of their cases developed pigmentation of the gums between the 5th and the 12th injection; 30% developed circumscribed ulcerations, and 2%, a generalized stomatitis. These results were apparent when 0.2 gram was administered every two days, and were materially reduced when bismuth was injected every three days.

Histopathological studies disclosed the presence of bismuth in the form of irregular granules in the capillaries uniting the arterioles and the venules with a resulting thrombosis. Bismuth was present on the endothelial walls and within the endothelial cells, pushing the nuclei to one side. The occurrence of plasma cells and lymphocytes in the derma were indicative of a certain amount of inflammatory reaction. Bismuth was also found by microchemical analysis, within the endothelial cells and in the circulation. The presumption was that the ulceration produced by the bismuth was by means of vascular obliteration.

Reports emanating for the most part from France, indicate that intolerance toward bismuth may manifest itself by the appearance of cutaneous reactions. Thus Galliot²⁹ reports as occurring during the course of bismuth therapy four dermatologic entities, a relatively severe form of generalized exfoliative dermatitis, a scarlatiniform erythema, a papulosquamous

erythema and an urticarial erythema. The eruptions, with the exception of the first form, were benign, lasted from several hours to several days, were unaccompanied by any constitutional symptoms, ceased when treatment was interrupted, and reappeared when it was resumed.

Icterus³⁰ has been reported as occurring late in the treatment of syphilis with bismuth.

As stated heretofore, practically every case in this series, undergoing treatment with bismuth, presented a slate gray to grayish brown pigmentation at the gingival borders of the gums, appearing as early as after the 4th injection, and in some instances, lasting as long as six weeks after all treatment had been terminated. The location and appearance of the bismuth line was very much like that usually seen in lead poisoning. As a rule, subjects with poor mouth hygiene, pyorrhea, and dental decay, exhibited a much more pronounced and lasting degree of pigmentation. On two occasions, it was necessary to discontinue treatment because of the pain elicited at the site of injection. On another occasion, the occurrence of severe joint pains was of sufficient moment to warrant the cessation of treatment.

One patient complained of severe toothache necessitating a rest of two weeks without treatment. In cases in which resumption of treatment is necessary, one must grope in the dark as it were, and administer small doses in order to prevent the reappearance of toxic symptoms. Urinary tests including exact examination of the sediment were carried out every two to six weeks, and in no single instance was any evidence of kidney damage discovered. Probably of some interest was a case of asthma and syphilis, in which the asthmatic symptoms appearing with great infrequency while the patient was receiving arsphenamine treatment, became markedly aggravated and were a source of great discomfort on the day following the administration of bismuth. In a small number of patients, there was noted while the injection of bismuth was being carried out, an attack bordering on the verge of syncope; just before the drug is wholly injected, the recipient turns very pale, perspiration becomes apparent on the brow and a state of collapse seems imminent. This state of affairs, however, passes very rapidly and is in all probability, a reaction similar to that not uncommonly seen when a small amount of blood is withdrawn for the purpose of a Wassermann test. No other deleterious effects, such as cutaneous eruptions, anorexia, loss of weight, chills or malaise were observed.

BISMUTH IN EARLY SYPHILIS

The golden opportunity in syphilis lies in its early stages when the definite recognition of the disease, followed by the immediate application of intelligent therapy, offers the most hopeful means of prompt subjection and ultimate cure.

Taking into cognizance reports previously mentioned regarding the relatively higher spirochocidal value of bismuth in comparison with that of mercury, bismuth was substituted for mercury in a small number of early cases, seven in all. In all cases, symptoms and signs rapidly subsided; in three instances the Wassermann test turned to negative following the administration of the final arsphenamine treatment, in two instances to negative after the final bismuth injection, in one instance to doubtful and in the last instance no serological change was obtained. It may be mentioned that every case presented a positive Wassermann reaction at the inception of treatment. In the observation of these cases, continuing to date, no relapse, either clinical or serological, was noted as occurring in those cases beneficially influenced by the treatment. The following is a typical case record: Case 1:—A white woman, aged 23, was seen with a typical syphilitic roseola; the Wassermann test was positive. She was seen three times in seven days, during which period she received two injections of 0.2 gram of potassium bismuth tartrate with butyn and one injection of neararsphenamine. She was seen three times a week for four weeks and twice a week for three additional weeks when a blood Wassermann reaction was thought advisable; this returned positive. Bismuth was then administered in the above mentioned dose twice a week until a total of three grams was received. Following a rest period of four weeks, the Wassermann reaction had turned to negative. No relapse has occurred.

Two cases were studied in which it was impossible to introduce arsphenamine by the intravenous route, and in whom the attendant pain was altogether too severe when sulpharsphenamine was administered intramuscularly. In both instances, bismuth only was used. The signs and symptoms rapidly retrogressed, the Wassermann test in one case turning to negative at the end of the first course, in the other to doubtful at the end of the first course and to negative at the end of the second.

The following is a record of one of these cases:

Case 2:—A woman, aged 26, married, entered the clinic presenting a late chancre of the right labium minor. Arsphenamine treatment was attempted, but failure resulted because of the marked obesity of the patient. Because of the pain incurred when sulpharsphenamine was introduced intramuscularly, it was necessary to use bismuth as a last resort. Table 1 presents the results obtained with the administration twice weekly of 0.2 gram bismuth over a period of eight weeks.

In the early stages of syphilis, when the most telling blow must be struck, it seems that the chemotherapeutic attack, as represented by the combined introduction of the arsphenamines and bismuth, offers a much more secure basis for the immediate control and final steriliza-

tion of the disease than the combination of arsphenamine and mercury.

BISMUTH IN ARSPHENAMINE JAUNDICE

An unfortunate complication occurring occasionally during the course of early syphilis is jaundice, due in most instances to an intolerance toward arsenic and in an extremely small number if at all possible syphilitic hepatitis. In just what proportion of the cases in which it occurs, blame may be laid either to one or the other, is very difficult to say. The most reasonable and the safest postu-

evident. Ten weeks after admission, a moderately marked jaundice appeared necessitating immediate cessation of all treatment. Twelve days after the appearance of jaundice, a profuse papular eruption became apparent on the face and trunk. Accompanying the latter was an inflammation of the iris. The latter were undoubtedly all manifestations of secondary syphilis. Twenty-one days following the appearance of jaundice, the sclerae cleared, the urine assumed a normal color and the stools, a normal consistency. The eruption and iritis, however, were still present. Treatment with

TABLE 1
BISMUTH AS AN ADJUNCT IN TREATMENT OF EARLY SYPHILIS

Case number.	Lesions	Form of treatment	Number of treatments with arsenical	Number of bismuth treatments	Average dose of bismuth—Gm.	Wass, one month after last bismuth injection	Subsequent treatment	Result
1	Chancre	Arsph. and bism.	6	14	0.2	To neg. from pos.	Arsph. and bism.	Early disappearance of chancre; no secondary lesions.
2	Chancre	Arsph. and bism.	1	15	0.2	To neg. from pos.	Bismuth	Early disappearance of chancre; no secondary eruption.
10	Papular	Arsph. and bism.	6	12	0.2	From pos. to doubt.	Arsph. and bism.	Good both as regard signs, symptoms and Wass. reaction.
11	Chancre	Arsph. and bism.	12	6	0.2	From pos. to neg.	Bism. in place of mercury	Early involution of primary; no secondaries.
12	Roseola	Arsph. and bism.	12	12	0.2	From pos. to neg.	Bism. in place of mercury	Early disappearance of rash; good effect on Wass.
13	Roseola	Neoarsph.	6	15	0.2	From pos. to neg.	Neoarsph.	Excellent.
14	Chancre	Arsph. and bism.	8	15	0.2	Remained positive	Arsph.	Early involution of chancre; no secondary manifestations.

late to maintain is that every case of jaundice occurring during or immediately after the administration of arsphenamine is due to the deleterious effects of the drug unless proven otherwise. In a small number of such cases occurring in this study, it was thought advisable, following the disappearance of the jaundice, to recourse to bismuth and to take no further chances with arsphenamine. The following is a report of such a case:

Case 3:—A man, aged 32, married, entered the clinic with a late primary sore of the penis. There was marked enlargement of the inguinal lymph nodes and the epitrochlear nodes were palpable. The Wassermann reaction was positive. Intensive treatment with arsphenamine and mercury was immediately instituted with rapid cicatrization of the chancre. No secondary signs or symptoms were subsequently

bismuth was instituted. The papules rapidly retrogressed and finally disappeared and the iritis improved to a marked degree. The Wassermann reaction was obtained in its negative phase at the end of the course of bismuth. The patient is still undergoing treatment with the drug; no jaundice or cutaneous signs have since been evident and in the negative phase the Wassermann reaction has been maintained.

Five additional cases, in which an intervening jaundice necessitated turning to bismuth as a measure of definite potency in continuing as near as possible an uninterrupted plan of treatment, form the basis of this phase of the study. Though these six cases appear to be a small number, the definite therapeutic effect on the lesions and in some instances on the Wassermann reaction, justifies the deduction that bismuth is of definite value in cases of this nature.

BISMUTH FOLLOWING A CUTANEOUS ARSPHENAMINE DERMATITIS—ERUPTIONS

Among the rarer and more disturbing complications occurring during the course of arsphenamine therapy, is a cutaneous arsphenamine eruption. Its presence is a matter of considerable importance in that immediate abstinence from all forms of antisyphilitic therapy is absolutely essential. Furthermore, following the disappearance of the eruption, arsphenamine must not be reintroduced because of the possibility of the appearance of further similar by-effects. If the desirability of using arsphenamine is still entertained, a considerable period of time must elapse before the patient again receives arsenic in any one of its forms. Taking these facts into consideration, it is obvious that with mer-

cephalalgia, one of an increased loss of hair, one of ostalgia and one of no symptom whatever. In three patients the Wassermann reaction was positive, in one doubtful, and in one negative. The results obtained were most encouraging. All symptoms disappeared at the end of from the fourth to the seventh injection of potassium bismuth tartrate. At the end of one course, two positive Wassermann reactions had been reversed to negative, the negative retained its status, the doubtful was changed to negative and one positive Wassermann was not at all influenced. The patients all showed clinical improvement, and four of the entire total of five presented an encouraging change in the Wassermann reaction. Up to the present, there has been no recurrence of the original eruption because of which a change in

TABLE 2
TREATMENT WITH BISMUTH FOLLOWING ARSPHENAMINE JAUNDICE

Case	Lesions	Previous treatment	Wass. before bism. medication	Average dose of bism.—Gm.	Number of injections	Wass. one month after last injection	Subsequent treatment	Result
3	Papular eruption	Arsph. and mercury	Pos.	0.2	15	Neg.	Bism.	No reappearance of jaundice; rapid disappearance of secondary rash.
15	None	Arsph. and mercury	Pos.	0.2	13	Doubt.	Bism.	Good.
16	Palpable liver	Arsph.	Pos.	0.2	12	Neg.	Bism.	Decrease in size of liver.
17	None	Arsph. and mercury	Neg.	0.2	15	Neg.	Bism.	
18	Pharyngitis (syph.)	Arsph. and mercury	Pos.	0.2	15	Neg.	Bism.	Disappearance of specific sore throat after 4th injection.
19	None	Arsph.	Pos.	0.2	15	Pos.	Bism.	

cury and potassium iodide as the only antisyphilitic measures left available, the control of an early case of syphilis presenting an arsphenamine eruption becomes a matter of some difficulty and concern. Moreover, the fact that a case of early syphilis inadequately treated, in contradistinction to those that have undergone adequate antisyphilitic therapy, may present late visceral and neurologic complications, arouses a certain degree of apprehension. With all this under consideration, five cases of early syphilis, in which an ensuing arsphenamine eruption necessitated interruption of the treatment, were studied with the purpose of ascertaining whether or not bismuth, used exclusively, could serve as a measure of sufficient potency in controlling the specific manifestations of the disease as presented in these patients. All five patients had received intense antispecific treatment before the appearance of the eruption; following the disappearance of the rash two complained of a moderately severe

treatment was necessary; and the improved Wassermann reactions have remained as such. A typical case history follows:

Case 4:—A male, colored, aged 39, entered the clinic in March, 1924, with a primary sore of the genitals. Dark field examination and Wassermann reaction were positive. The usual intensive antisyphilitic measures were applied. Following a total of ten injections of arsphenamine and four of an insoluble salt of mercury, a fine pin-point papular and scaling eruption, which was moderately itching, appeared on the lower third of the extensor surfaces of both arms and the backs of both hands. Treatment was immediately discontinued. Following a period of six weeks in which no therapy was attempted, the eruption entirely cleared. At this time the patient complained of severe nocturnal headaches. The Wassermann reaction was positive. Injections of bismuth were then started, the patient receiving 0.2 gram potassium bismuth tartrate once a week until a total

of three grams was received. The headaches disappeared at the end of the sixth injection, a feeling of general well being became evident, the Wassermann reaction turned to negative at the end of the course and no cutaneous signs became evident.

The results obtained in the preceding cases were sufficiently definite and encouraging to sustain the further use of bismuth in cases of this nature.

BISMUTH IN ARSENIC-RESISTANT AND MERCURY-RESISTANT SYPHILIS

In a syphilis clinic of large proportions, one is occasionally confronted with types of cases which call forth a certain degree of therapeutic ingenuity. The occasional existence in a patient of a strain of spirochaete, the clinical manifestations of which will resist both arsenic and

red, indurated, pea-sized papules which rapidly broke down becoming painful and disfiguring to a marked degree. The Wassermann taken at this time had turned positive. Treatment with mercury was immediately discontinued and arsphenamine used in its place. Its effect on the cutaneous lesions was rapidly apparent. The papules and ulcerations disappeared and at the end of the 8th arsphenamine injection the Wassermann reaction was again negative.

When treatment with mercury was once again instituted, the exact duplication of events occurring when mercury alone was previously used took place. The Wassermann reaction again became positive. The papules and nodules which had reappeared, were immediately influenced by the injection of one arsphenamine and one bismuth in seven days. At the end of four weeks, the cutaneous lesions had

TABLE 3

BISMUTH MEDICATION FOLLOWING SUBSIDENCE OF ARSPHENAMINE ERUPTIONS

Case	Type of eruption	Previous treatment	Wass. before bism. medication	Average dose of bism.—Gm.	Number of injections	Wass. one month after last injection	Subsequent treatment	Result
4	Maculo papular on hands and arms	Arsph. and mercury	Pos.	0.2	15	Neg.	Bism.	No reappearance of eruption; disappearance of headaches.
20	Urticaria	Arsph.	Neg.	0.2	15	Neg.	Bism.	
21	Icthyosiform eruption on arms and legs	Arsph.	Pos.	0.2	15	Neg.	Bism.	Great decrease in scaling; disappearance of bone pains.
22	Scaling macular eruption both lower arms	Arsph. and mercury	Pos.	0.2	15	Doubt.	Bism.	Loss of hair diminished.
23	Erythema multiforme	Arsph.	Pos.	0.2	12	Pos.	Bism.	

mercury is an accepted fact; and its presence usually places the physician treating it in a quandary. In three cases of this nature, bismuth was resorted to with highly gratifying results. In all three the manifestations of this type of syphilis were definitely controlled and placed in a state of definite subjection by intramuscular injections of bismuth. The following cases will illustrate the preceding:

Case 5:—A man, aged 23, entered the clinic in Sept., 1923, with a primary lesion of the genitals and a positive Wassermann test. Intensive treatment with arsphenamine and mercury was carried out with rapid disappearance of the chancre and the production of a negative Wassermann reaction. Following the requisite number of arsphenamine injections, treatment, in which only mercury was used was started. Following the fourth injection of an insoluble salt of mercury, there appeared on the forehead, nose and both arms, many dark

entirely disappeared and the Wassermann reaction had assumed a negative phase. Two weekly injections of bismuth were then given until a total of three grams were administered. There Wassermann was maintained as negative and no cutaneous signs reappeared up to the patient's disappearance from the clinic in Aug., 1924. It may be said in passing, that at no time following the first omission of mercury was it again used. This case was undoubtedly a case of definite mercury resistant syphilis.

Case 6:—A woman, married, aged 25, entered the clinic in Dec., 1923, with a recently healed ulcer on the right labium major and a generalized syphilitic roseola. The Wassermann test was positive. Following intensive treatment, all signs of syphilis disappeared and the Wassermann was reversed to negative. Six weeks after entrance, a slightly itching macular and maculopapular eruption appeared on the trunk and thighs. At first it was thought that the

eruption was due to arsphenamine and therefore the administration of the latter drug was discontinued. The eruption, however, became rapidly more profuse. The Wassermann reaction was positive. 0.2 gram potassium bismuth tartrate was then injected twice in seven days. The eruption disappeared after the 6th injection and the Wassermann reaction changed to negative at the end of the 15th. This case portrays the results that may be obtained with bismuth in arsenic-resistant syphilis.

The results obtained in three cases of this nature confirm clinically, the evidence presented by Klauder²¹ in experiments in which he produced animals infected with syphilis and resistant to arsenic but vulnerable to the anti-specific effects of bismuth.

Six cases of this type were studied. In all the only therapeutic measure resorted to, was the administration of bismuth. At the termination of one course, three cases exhibiting positive Wassermann reactions remained positive, one positive was changed to doubtful, and two to negative. The following is an illustrative case:

Case 7:—A private patient, a woman aged 42, was seen who presented an entirely negative history with the exception of frequent headaches and a feeling of being below par. The physical examination was entirely negative. Two consecutive Wassermann tests were positive. After receiving 0.25 gram arsphenamine the patient exhibited a marked reaction. On the following week she received 0.15 gram neo-

TABLE 4

THE USE OF BISMUTH IN THOSE EXHIBITING ARSPHENAMINE REACTIONS OR NITRIDOID CRISES

Case	Lesions	Wass. before bism. medication	Average dose of bism.—Gm.	Number of injections	Wass. one month after last injection	Subsequent treatment	Result
7	None	Pos.	0.2	12	Neg.	Bism.	Marked improvement in subjective symptoms; Wass. still neg.
25	Scaling syph. eruption	Pos.	0.2	15	Pos.	Bism.	Disappearance of rash after 7th injection.
26	None	Pos.	0.2	15	Pos.	Bism.	After 2nd course Wass. doubtful.
27	None	Pos.	0.2	14	Pos.	Bism.	
28	Chancre	Pos.	0.2	15	Neg.	Bism.	Rapid involution of chancre; no subsequent secondary signs or symptoms; no relapse of Wass. reaction.
29	None	Pos.	0.2	15	Doubt.	Bism.	

BISMUTH AS AN ALTERNATIVE FOLLOWING THE NITRIDOID CRISES OCCURRING DURING ARSPHENAMINE THERAPY

Untoward reactions occurring during or soon after the administration of arsphenamine, are seen with relative frequency. They invariably call for a reduction in the amount of arsphenamine received by the patient. This, in the great majority of instances, suffices for the prevention of the recurrence of this manifestation which in its most classical aspects is represented by a rapid suffusion of the face, a sensation of ensuing suffocation and collapse or severe pain in the lumbar region. If a reduction in the amount of arsphenamine administered does not act as a preventive, one may usually turn to either neoarsphenamine or sulpharsphenamine with, as a rule, successful results. However, there occur occasionally cases that will not tolerate arsenic in any form or at the most will imbibe an amount which appears to be below the therapeutic level desired in the case at hand. Mercury by itself, seems in cases of this nature to be of insufficient value.

arsphenamine with a similar result. Five days later she received 0.15 sulpharsphenamine and late in the evening of the second day, thirty-six hours later, she experienced a severe chill lasting fifteen minutes. It was then decided to resort to bismuth. 0.2 gram was injected every seven days for twelve weeks. The headaches disappeared entirely, the general condition of the patient improved greatly, and the Wassermann reaction was changed to negative. Following a two months period without treatment a second course was completed. No further treatment was attempted. The patient has gradually gained in weight. Blood for Wassermann tests has been taken every two months during the past ten months but no reversal of the reaction has taken place.

BISMUTH IN CARDIOVASCULAR SYPHILIS

When first introduced it was thought that salvarsan as a drug was too powerful and the probable ensuing effects too deleterious to be used in patients suffering with cardiovascular

disease. This conception has in the course of time been modified, and the arsphenamines are being administered, carefully and in small doses to be sure, in specific disease of the circulatory apparatus. Concerning the heart, it is evident that an organ of its nature, brought to a much lower level both as regards its susceptibility to injury and its capacity for work, must suffer greatly by any untoward effect produced by the intravenous introduction of a drug with the properties of salvarsan.

In a study of ten patients treated at their clinic, Keidel and Kemp²¹ report certain interesting observations. Two patients treated with arsphenamine died, one immediately after a third injection of arsphenamine, and the other several days after receiving the drug. Death in both instances was preceded by signs of cardiac failure. Because of the occurrence of severe reactions, it was necessary to discontinue arsphenamine in the third case. The reaction observed was the cause of grave alarm. During the course of the injection there was apparent sudden syncope, cyanosis, a greenish pallor, and cold sweat. Respirations became slow and gasping. There was bradycardia, with lowering of the blood pressure, and small, often imperceptible pulse. The effect of arsphenamine in cases of this nature is probably produced by a toxic action on the heart muscle itself and on the conducting apparatus.

These authors state furthermore, that very little can be accomplished with mercury and potassium iodide as the only form of therapy. Only one of six patients so treated, showed symptomatic improvement, but no change in the physical signs. One was no worse after two and one half years of treatment; one was worse after one year of treatment; two became too ill to return to the clinic, and one died. All patients in this subgroup remained sero positive.

Confronted in every instance in cases of this nature, with the possibility of a severe reaction and subsequent possibility of death when arsphenamine is administered, the introduction of this drug in cases of cardiac syphilis should be considered with some apprehension. Moreover, the apparent therapeutic inefficacy of mercury and iodide used alone, is an added obstacle in the treatment of this type of syphilis.

It is suggested that in cases of this nature bismuth, together with potassium iodide, be used instead of arsphenamine and mercury. In a perusal of the literature it has been impossible to find any reference pointing to an untoward action of bismuth when used in patients with heart disease and an added syphilitic infection, or in subjects manifesting syphilitic heart disease. It is also suggested that bismuth be given a trial either as an adjunct to arsphenamine or in its stead in certain selected cases of aortitis and aneurysm.

Case 8:—A man, aged 43 years, was seen presenting an enlarged heart and signs of

definite aortic regurgitation. He complained of slight shortness of breath and occasional precordial pain. The Wassermann reaction was positive. He received 0.15 neoarsphenamine and before the intravenous injection had been completed, he presented an alarming reaction. Pallor, a cold sweat, and gasping respirations were evident. The heart rate became definitely slower and many extrasystoles were heard. Adrenalin was immediately administered with a slow recovery of the patient. On the following week bismuth was injected intramuscularly in a dose of 0.1 gram. Up to the present time he has received 1.2 grams potassium bismuth tartrate without any untoward results. There has been no change in the Wassermann reaction and no change in the physical findings. There has been, however, a marked symptomatic improvement.

EFFECT OF BISMUTH IN WASSERMANN-FAST LATENT SYPHILIS

This group is made up of seventy-nine patients, all of whom had received treatment with arsphenamine and mercury during the course of from one to seven years. Seventy-five have

TABLE 5
EFFICACY OF BISMUTH IN "LATENT" WASSERMANN-FAST
SYPHILIS

Number of cases	Reaction of Wass. before treatment	Number of injections	Average single dose	Change to neg.	Change to doubtful	Unchanged	Relapse
75	Pos.	15	0.2	24	3	48	3
4	Pos.	30	0.2	2	2		1

already received one course of bismuth intramuscularly and are undergoing a second course of treatment, and four have already received two courses of treatment. Twenty-four patients presented a seronegative reaction and three a change to doubtful at the end of one course. Of the four who have received two courses of treatment, two cases which were negative at the end of the first course have remained negative and two cases which were positive were turned to doubtful. Three cases which were negative at the end of the first course, relapsed and were positive when a second course was begun. Three cases having been changed to negative at the termination of one course, were given arsphenamine, at the end of a course of which, the Wassermann changed to positive. One case presenting a doubtful reaction at the end of the second course also relapsed to positive when given arsphenamine. The deductions to be drawn from these results

are evident. All cases of arsenic and mercury fast cases of latent syphilis should be given a trial with bismuth. Subjects showing no results at the end of one course, should be placed under further treatment with this drug. Furthermore, when a promising serological result is obtained, it is advised that the form of medication bringing it about be continued until a persistently negative Wassermann reaction is maintained.

SUMMARY

Bismuth places in the hands of the medical profession another anti-syphilitic drug to which it may recourse when certain inevitable pitfalls occur during the course of a disease with the many sided nature of syphilis. The results of the studies of authors quoted, leave no doubt as to its spirochetocidal value which obviously cannot be as immediately efficacious as that of the arsphenamines, because of the much larger amount and the manner in which the latter is administered.

Its superiority over mercury both in its spirochetocidal and serologic aspects are plainly evident. Milian in this regard places it midway between the arsenicals and mercury and compares the therapeutic activity of arsphenamine, bismuth, and mercury in the following manner: the therapeutic activity of arsphenamine is represented by the figure 10, that of bismuth by 7 and that of mercury by the figure 4. With this in view, bismuth must be seriously considered in the future as an adjuvant to the arsenicals in the routine treatment of the average case of syphilis. When conservatively administered, its untoward effects are not greater and of no graver moment than those obtained with mercury.

In cases of jaundice and of arsphenamine dermatitis due to arsenic, in which potent anti-syphilitic measures are desired, and in which it is necessary to obviate the reappearance of these untoward states, bismuth may be used with satisfactory results both clinically and serologically. Cases with arsphenamine intolerance as manifested by nitritoid crises, are equally favorably influenced. In addition, in cases in which there is evident a strain of *Spirochaeta pallida* with its ensuing manifestations, resistant to either arsenic or mercury or to both, bismuth has been of definite potency in controlling all signs and symptoms of the disease.

Although the obtaining of a negative Wassermann should not be considered the solely desired end result in every case of syphilis, it must be admitted that a negative reaction is a source of comfort to both physician and patient, and presents a basis for a more rational and definite plan of future treatment. In obtaining a definite change in the Wassermann reaction in 34% of a total of 79 cases at the end of a single course of bismuth with the probab-

ity of a somewhat larger proportion occurring after further treatment, it is easily seen of what distinct value bismuth is in this connection. It has proved in our hands far superior to sulpharsphenamine¹⁰ in cases of this nature.

It is suggested that bismuth be given a trial in cases of syphilitic cardiovascular disease when the latter cannot or should not receive arsphenamine or any of its allied products.

It is generally¹⁹ held that the baneful action of irregular and lapsing treatment in syphilis, increases the incidence of visceral and neurosyphilis. A small number of arsphenamine injections administered during a comparatively long period of time, and then followed by the cessation of treatment, places the patient in a state similar to that obtaining in the early incubation period of syphilis when spirochaetes abound and the host exhibits no immunologic response. Ehrlich's explanation of this phenomenon is as follows: "In these patients, the greater number of spirochaetes are destroyed by the powerful spirochaetocidal of arsphenamine. So rapidly is this accomplished that the usual tissue immunity which develops as a result of contact between parasite and host, is lacking; as a result, a small focus of spirochaetes in the tissue of the central nervous system, which may escape the action of salvarsan develops in the susceptible host with great rapidity and severity." Bismuth, because of its lower spirochetocidal value and slower rate of absorption and elimination, should not when introduced lower the immunologic response of the patient to the degree in which arsphenamine tends to. With this explanation at hand, it is thought that the use of bismuth in cases of this character, may be followed by a lower incidence of visceral and neurosyphilis.

From the point of view of expectancy rather than from any proof definitely presented, it is suggested that bismuth be used as an adjunct to the drugs accepted at present as of definite value in the treatment of syphilis of the nervous system.

In the final analysis, it is hoped that the impression is not conveyed that bismuth is a cure-all but that it should be resorted to when syphilis cannot be controlled by methods at present in vogue. Its application should be limited to those cases resistant to the arsenicals, or in which it is inadvisable to introduce the latter. In addition its use as an adjunct to the arsphenamines in all types of syphilis in contradistinction to the long established use of mercury in this connection, is presented as a subject to be seriously considered and given further trial.

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THE INTRASPINAL USE OF GENTIAN VIOLET*

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THE importance of therapeutics in septicemia and allied conditions has been responsible for the rapid advance in the study and application of chemo-therapy. The results attending its use have been encouraging enough, at least, to warrant continued application in the search for bacterial antagonists. Heretofore, the bacterial antagonists have been chiefly lytic in action; in the ease of the dyes, however, Churchman¹,² has demonstrated that it is primarily the inhibition of growth by staining that constitutes its *modus operandi*, and hence he rightly insists that this effect be termed bacteriostatic rather than bactericidal.

In the field of the try-phenyl-methane dyes, of which gentian violet is the chief one used, Churchman has been the pioneer. In 1912, he first showed the selective bacteriological action of gentian violet towards Gram positive organisms. That there is a rough parallelism between this selectivity and Gram reactivity has also been stated, though there are definite exceptions. From its original therapeutic application to joint infections³,⁴, its domain of use has broadened, until we find in the literature reports of treatment by it of empyema⁵, otitis media⁷, septicemia⁸,⁹, diphtheria wound infection¹⁰ and carriers¹¹.

Gentian violet will exert inhibitory action in dilutions of 1 to 1,000,000 *in vitro*¹¹. Churchman has demonstrated experimentally on synovial membrane and intestinal mucosa that it has no deleterious effects on tissue cells. Cells cultured *in vitro* continued to reproduce even though nuclear staining had occurred¹². The reaction of the meninges would probably resemble most that of the synovial membrane. It

was impossible to say whether the more vulnerable nervous tissue of the spinal cord would be equally unaffected; no data could be found in the literature relating to the action of the dye on nervous tissue.

The feasibility of intraspinal use presented itself in two cases. These were cases of established general paresis, both having received a long course of Swift-Ellis intraspinal injections of pooled Tryparsamized serum.^{*} Following one of the treatments, both patients complained of headache. In one case there was an accompanying slight rigidity of the neck and a rise in temperature to 102 the following day. Immediate drainage yielded a spinal fluid showing a pleocytosis with a preponderance of polymorphs. Then followed, in that case, a course of irregular temperatures, not definitely of the so-called septic type, lasting seven weeks and terminating fatally. During this period, the treatment consisted of spinal drainage two to three times a day and intraspinal injections of gentian violet. (See tables.) A complicating factor was a purulent and gangrenous cystitis following frequent catheterization.

In the other case, there was a more typical temperature chart with daily swings from 99 to 104 for five and one-half weeks, after which there was a dramatic fall to normal with complete recovery. Both patients received a few injections of mercurochrome intravenously. Although both cerebrospinal fluids were purulent in character, no growth was obtainable on plain agar, blood agar and bouillon.

The initial intraspinal injections were given in a strength of 1 to 500,000 in aqueous solution. The dosage varied with the amount of fluid withdrawn but averaged 25 c.c. warmed to body

*It is customary to make up a batch of serum usually lasting a few weeks.

*From the Neurosyphilis Clinic, Boston Psychopathic Hospital. This study was aided by a fund granted by the Massachusetts Mental Hygiene Division.

temperature. A pseudo-lavage was performed by withdrawing slowly the gentian violet and re-introducing slowly fresh gentian violet. In most instances it was possible to withdraw the gentian violet but once, as the fluctuation in pressure caused rather severe headaches. Since it was noted that after a number of injections none of the fluid at the next drainage showed the violet

slight turbidity where the fluid was previously clear, with a concomitant increase in cells.

Whether the avidity of tissue for the dye resulted in rapid absorption of the dye or whether a certain proportion diffused throughout the cerebrospinal fluid was a matter of conjecture. Both factors probably played a role in the rapid disappearance of the color. It is highly probable that a strength far exceeding the one

CASE 1

Day of Disease	Condition of Patient	Form of Treatment	C. S. F. Findings	Blood Findings
1st to 22nd	Irregular temperature, mostly at a range between 102° and 104°. Headache and chilly sensations; occasional vomiting. Slight rigidity of the neck; no Kernig or other signs of meningeal irritation.		1st day: Fluid clear. 161 cells. 30 lymphocytes and 124 polys and 7 endothelial cells. 2nd day: Fluid clear. 19 cells. 8th day: Fluid clear. 61 cells.	W. B. C. 9,000 to 13,000
22nd	General condition about same. Loss of weight. Persistence of temperature 99° to 103°. Fluids and nutrition well taken.	Patient started on spinal drainage three times daily.	Fluids slightly cloudy. Cells in the hundreds, mostly polymorphs. No growth on plain agar, blood agar or bouillon.	
23rd	Patient's condition the same.	Spinal drainages three times a day, followed by intraspinal injections of gentian violet.	Fluids cloudy and yellowish. Marked pleocytosis.	W. B. C. 17,000
24th	Patient stuporous. Temperature still elevated.	Spinal drainages and intraspinal gentian violet.	Fluids cloudy and yellowish. Marked pleocytosis, mostly polymorphs.	
25th	Patient out of stupor; consciousness and rational. Bladder distended. Patient unable to void. Catheterization necessary. Urine negative.	Spinal drainage and intraspinal gentian violet. Hexamethylenamine by mouth.	Cloudy, yellowish cells in hundreds mostly polymorphs in all fluids.	
26th to 32nd	Patient conscious and rational. Headache and vomiting. Temperature persists 100° and 102°. Urine shows pus and bacteria.	Spinal drainage and intraspinal gentian violet. Bladder irrigation with boric acid started.	Yellowish—gradual clearing in turbidity and decrease in cells.	W. B. C. 16,000
32nd to 39th	Patient's general condition about the same. Temperature extremely irregular, chiefly in range of 101° to 102°. Incontinence of urine. Urine very foul and purulent.	Spinal drainage and intraspinal gentian violet. Bladder irrigation continued.	Fluids still turbid and slightly yellowish. Cells now under one hundred.	W. B. C. 15,000 to 17,000. Blood culture negative.
39th to 51st	Patient gradually went into a stuporous and irrational condition. Fails to remember names. Incontinence of urine and feces. Temperature same. Gradually went down hill and died on 51st day.	42nd day two drainages and gentian violet. 43rd day mercurochrome 30 c.c. intravenously with reaction. Bladder now washed with boric and 1% mercurochrome introduced.	Fluids remained faintly yellowish with 50 to 125 cells and predominance of polys.	W. B. C. 18,000 to 19,000.

color, the strength was doubled to 1 to 250,000. Owing to the frequent injections it was deemed inadvisable to go beyond this strength of 1 to 250,000 even though after this no color appeared at the following drainage. Even when the diurnal drainages were but three or four hours apart, there was no evidence of the violet color in the withdrawn fluid on gross examination. If, as was occasionally done, after one or two drainages during the day we abstained from injecting the gentian violet, there was constantly noted an increase in turbidity, or a

we used can be injected with impunity. In no instance was an injection followed by a reaction either general or meningeal. No cistern punctures were performed to see whether the gentian violet had ascended to the base of the brain, although it has been shown by Solomon¹³ that dyes such as phenolsulphonephthalein diffused rapidly through the cerebrospinal fluid.

Precisely how important a factor the gentian violet was in the recovery of one of the patients it is difficult to state. That there was a drain-

age of about 50 to 60 c.c. of cerebrospinal fluid preceding each injection may very materially have aided towards the patient's recovery. The chief purpose in presenting this report is to make note of the apparent innocuousness of our disposal three routes by which to reach the meninges or ventricles, viz., ventricular, cistern or lumbar puncture, drainage and injection of such a remedy as gentian violet may possibly yield results in an otherwise hopeless condition.

CASE 2

Day of Disease	Condition of Patient	Form of Treatment	C. S. F. Findings	Blood Findings
1st	Irregular temperature, vary- ing from 100° to 104°. No signs of meningeal irritation such as neck rigidity or Kernig.			W. B. C. 14,000
22nd	Occasional vomiting and head- ache. Patient conscious and rational. Urine shows S. P. T. to T. albumen; otherwise negative.			to 17,000
22nd	No change in patient's condi- tion.	Patient started on spinal drainage three times a day.	Fluids turbid. Marked ple- ocytosis averaging around 1000 cells, 60% to 70% polys.	
23rd	Patient conscious and ration- al. Temperature 101° to 102°. No vomiting. Slight head- ache. Retention of urine. Catheterization necessary.	Spinal drainages three times daily followed by in- traspinal injections of gen- tian violet.	Fluids slightly turbid. Ple- ocytosis 1000 cells ± in all fluids; mostly poly- morphs. No growth on plain agar, blood agar or bouillon.	
25th	Headache, constipation and retention of urine.	Spinal drainage and gen- tian violet injections con- tinued. Hexamethylen- amine. Catheterization nec- essary.	Slight turbidity and yel- low colored. Cell counts high, and culture media still show no growth.	W. B. C. 11,000 to 13,000
25th to 30th	Temperature 100° most of the time, reaching 104.2° on 30th day. Patient fairly comfort- able, taking nutrition well. Marked reaction to mercuro- chrome, with chills and diar- rhea.	Spinal drainages and gen- tian violet injections con- tinued as above. Mercuro- chrome 20 c.c. given intra- venously on the 30th day.	Less turbidity. Yellowish color marked. Cells 200 to 300.	
31st to 36th	Patient comfortable and symp- tom-free. Temperature swing- ing from 97° to 103° daily. Still has retention of urine. Catheterization still neces- sary.	Drainage with gentian vio- let continued.	Mostly clear and yellowish. Occasional slight turbidi- ty. Cells 100 to 200.	W. B. C. 10,000 to 12,000
36th to 42nd	Temperature swings contin- ued. Marked loss of weight noted. "Patient feels fine." Patient voiding normally. Daily enemas necessary. No reaction to mercurochrome injections.	Drainage and gentian vio- let diminished to twice daily. 40th day 20 c.c. mercurochrome given in- travenously. 41st day 30 c.c. mercurochrome inject- ed.	Fluids clear. Diminution of yellow color. Cells over 100.	W. B. C. 10,000
43rd	Patient feeling fine, tempera- ture dropped to normal. Pa- tient in excellent condition. No urinary retention.	Drainage and gentian vio- let discontinued.		
43rd to 51st	Patient feeling fine. In ex- cellent condition.	Drainage every few days.	Fluid faintly yellow tinged. Cells 70 to 80.	
51st to date	Patient gradually allowed up and about. Temperature nor- mal since.		Fluid clear and colorless. 10 cells with 9 lympho- cytes.	

gentian violet when introduced intraspinally.

Despite the few recoveries reported, the presence of a staphylococcus, streptococcus or pneumococcus infection of the meninges spells doom. Radical procedures are justifiable if they hold out the minimum of promise as therapeutic possibilities. It is here suggested that having at

SUMMARY

Two patients with meningitis were given numerous and frequent intraspinal injections of gentian violet in dilution of 1 to 250,000 by weight, without producing any evidence of irritation to the meninges or nerve roots. We therefore conclude that in cases of meningeal

infection with the common Gram positive organism frequent drainage followed by injection of gentian violet either into the lumbar space, intraesternally or intraventricularly, may be of distinct value.

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MERCUROCHROME IN THE TREATMENT OF GONORRHOEA IN WOMEN

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I WOULD not be rash enough to state that mercurochrome will cure gonorrhoea in women, because I do not think anybody can say positively that in any given case the disease has been eradicated, but by its use you can cure symptoms and free the urethra, introitus vaginae, vault of the vagina and cervical canal of gonococci.

Before using mercurochrome I used methylene blue in suppository form following the method of treatment pursued by Dr. A. K. Paine at the Boston Dispensary.

Methylene blue in suppository form gave very good results, but getting the wonderful results following the use of mercurochrome in destroying micro-organisms elsewhere, I began using it in the vagina.

I will describe the method of its use by reporting my last case, which was in the spring of 1924. The symptoms which had been present for some weeks were chaude-pisse, profuse vaginal discharge and burning and itching at introitus vaginae.

Expert examination found gonococci in smears from urethra, introitus vaginae, vaginal vault and cervix uteri.

On retiring she was ordered a douche of warm water, then with index finger protected with rubber cot she pushed a 2% mercurochrome suppository up into Douglas pouch.

This she repeated every night for fourteen—wearing at all times a napkin.

Ten days after using the fourteenth suppository smears were taken from the urethra, introitus vaginae, Douglas pouch and cervical canal, and all were found negative.

This was repeated twice with an interval of seven days between the examination of smears, and on each examination the smears were negative.

All symptoms disappeared and have not returned. The mercurochrome thoroughly permeates the lining structures of urethral, vaginal and cervical membranes.

LINGUAL ABSCESS

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ABSCESSSES of the tongue are not sufficiently common clinically to warrant the placing of much emphasis on the condition in the literature. They do appear often enough, however, to necessitate our being on the look-out for them so that we may recognize them.

The textbooks dwell on lingual abscess little more than to mention it in connection with paracymatous glossitis, which may be regarded as one phase of lingual abscess.

The first case of abscess of the tongue was reported in 1816. Bennett's report on the subject in 1907 is quoted extensively by later writers. From the literature covering a period of 90 years, he collected 145 cases. In these cases three deaths were reported: one due to

suffocation, one to hemorrhage, and one to pneumonia following rupture of the abscess and aspiration of pus.

The anatomy of the tongue should be briefly considered in order the better to understand how infection may develop and the most probable course it may be expected to pursue.

Anatomy. The tongue is freely movable, very muscular, and fills the cavity of the mouth; it is designed primarily to aid in mastication, deglutition, taste, and speech.

The root of the tongue is attached to the hyoid bone and is supported on each side by a sling of muscles from the styloid process of the temporal bone and the anterior palatine arches. The inferior surface is connected with the sym-

physis of the lower jaw by the geniohyoglossal muscle. The mucous membrane on the upper surface is composed of thick, stratified epithelium which is constantly renewed as it exfoliates. The furring or coating on the tongue is composed of exfoliating epithelium associated with fungi which are always found in the mouth. The nature of this coating varies according to the state of the digestive canal; hence, the importance in general practice of examination of the tongue.

The dorsum of the tongue is divided by a raphe into symmetrical halves which end at the level of the isthmus of the fauces in a depression known as the foramen cecum; this contains the opening of the several large mucous glands. The posterior third of the organ is quite smooth; the anterior two-thirds contains several varieties of papillae which are supported by a connective tissue layer which, in turn, is attached to the underlying muscle tissue. This layer, or corium, is composed of a dense network of elastic and connective tissue continuous with the intermuscular septa and contains vessels, nerves, and lymphatics.

The papillae have as their function, taste and touch. During fevers, especially exanthematous fevers, these fungiform papillae become intensely reddened.

The mucous membrane on the under surface of the tongue is loose and lies in folds. In the front of the mouth is the frenum linguae reflecting from the gums. In some cases this may be shortened, resulting in tongue-tie. On the sides, the mucous membrane is reflected from the base of the tongue to the body of the lower jaw and covers the myo-hyoid muscle, forming the floor of the mouth. At the back, folds pass on each side to the soft palate, enclosing the palatoglossi muscles, glosso-epiglottic folds, and frenum epiglottis; the last of which raises the epiglottis when the tongue protrudes. The orifices of the submaxillary ducts open upon elevations of mucous membrane close to the frenum. Connective tissue and lymphoid tissue in large part compose the substance of the tongue within its capsule; lymphoid tissue is especially predominant in the root. It is the presence of this more or less areolar structure in the midst of dense surrounding tissue which allows so much swelling in acute inflammation; and the tension to which the surrounding tissue is subjected results in excruciating pain.

It may be seen from the review of the anatomy that the dense capsule of the tongue protects it from invasion by bacteria; but in case bacteria should penetrate the membrane the abundant and profuse blood supply of the organ facilitates the attack against infection. It can also be seen that the more or less loosely arranged areolar tissue in the base furnishes a likely place for abscess formation should infection gain the upper hand.

Etiology. Our understanding of the etiology

of lingual abscess is vague and indefinite. Tonsillitis, pyorrhea, dental caries, or infection due to trauma are the most usual factors. The habit of chewing grasses or wisps of hay, common in farming districts, and possibly the use of a toothpick are instrumental in introducing bacteria into the substance of the tongue. The exact cause is always uncertain, because the abscess develops over a period of several days and in its early stages is generally thought to be a sore throat. Abscess formation has been noted following tonsillectomy.

Symptoms. The symptoms of lingual abscess are ushered in by a slight soreness on swallowing which gradually increases in severity until deglutition is impossible. The tongue becomes so enormously swollen it fills the mouth and even causes the patient to hold the teeth apart in order to accommodate the organ. The tongue is immobilized because of the excruciating pain resulting from any attempt to protrude it or move it in any way. Even talking is painful. Other signs and symptoms accompanying infection are present, such as fever and general malaise. The glands directly under the jaw in the submental region become swollen and painful and the entire cervical region is involved accompanied by pain in the ears. Because of the patient's inability to swallow, it is not infrequently noted that the saliva is allowed to drip from the mouth, thereby adding to the general picture of misery.

Diagnosis. The diagnosis of lingual abscess is made by the history of rapid onset with increasing pain on swallowing, immobility of the tongue, swelling of the submental lymphatics, and increased curvature of the dorsum of the tongue with pain on palpation, especially when the examining finger is run along near the base. In some cases a definite area of localized induration may be felt and this also will be the point of greatest pain.

One must differentiate the so-called simple abscess from a number of other conditions. Anthrax is necrotic and the discharge from the ulcer is bloody; microscopic examination reveals the typical *Bacillus anthracis*. Actinomycosis is differentiated by the lack of extreme pain, slower onset, and the finding of the typical sulphur bodies and ray fungus. Leprosy is associated with anesthesia and other signs of the disease. Gumma of the tongue is not painful; the swelling is firm; it is usually circumscribed, and not associated with such extensive parenchymatous glossitis. Other signs of syphilis are manifest, such as a general glandular involvement. In salivary calculus the submental and submaxillary glands are painful and swollen and it may even be painful to move the tongue; but this feature is not so marked as in abscess. The calculus can usually be palpated in the duct. Abscess may appear first on one side, then on the other, or it may involve both sides simultaneously.

Treatment. The swelling in lingual abscesses increases until the abscess ruptures spontaneously, or until it is incised and the pus liberated. In the early stages, the most comforting therapy is hot lavage. The irrigating outfit consists in an irrigating can, or fountain syringe. One or two quarts of normal saline solution, as hot as the patient can tolerate, is allowed to flow and splash over and around the tongue. The head is kept tipped forward to allow drainage from the mouth, and the procedure is repeated every hour. Occasionally, this treatment is sufficient to cause the rupture of the abscess, which usually occurs on the dorsum of the tongue. One must guard against aspiration of pus, with possible establishment of pneumonia.

If the abscess does not rupture in a reasonable length of time, an incision should be made with a long slender knife. The incision should be started at one side under the tongue and the blade crowded backward and downward in order to avoid the ranine artery and vein. It may be necessary to penetrate a depth of 5 or 8 cm. before pus is reached. Occasionally, the insertion of a long exploratory needle will serve as a guide to the exact location of the pus.

As a rule, the establishment of drainage affords sufficient relief to enable the patient to take nourishment within three hours. As soon as possible fluids should be pushed. Patients usually recover in about forty-eight hours.

The danger of hemorrhage and pneumonia has been mentioned. Dean reports the necessity of performing tracheotomy because of laryngeal edema.

An attack of glossitis with abscess formation does not seem to predispose to subsequent attacks and apparently leaves no distortion of the tongue.

REPORT OF CASE

A farmer, 28 years of age, was brought to the Jackson Clinic as an emergency case by the home physician. He had had a fever of 103°, a high leukocyte count, and a history of a slight sore throat, which developed, without apparent cause, about ten days previous. There was no other complaint. The soreness was not definitely localized in the region of the tonsils. Very little change occurred until three or four days later when the patient awakened one morning and found it very difficult to swallow food. He also complained of aches and pains throughout the body, a severe headache, chilly feeling, and all of the general symptoms of acute infection. Within twenty-four hours he was unable to swallow fluids without suffering most excruciating pain, and talking was accomplished with great difficulty. The jaws were held in a rigid position and the doctor stated that it was with great difficulty that he was able to see into the throat at all. The tongue depressor seemed to cause considerable pain, and the pa-

tient was unable to protrude the tongue. The morning before the patient was brought to the hospital the doctor noted that the tongue was enormously swollen, filling the mouth and protruding between the teeth. There was a tendency for saliva to drip from the mouth. Any attempt to protrude the tongue or grasp it was enough to cause the patient to scream with pain. A diagnosis of parenchymatous glossitis was made and the patient sent to the hospital.

Examination confirmed the findings as noted above with the addition that the glands under the jaw and especially in the submental region were greatly enlarged and exceedingly painful. On inserting the finger between the teeth, the tongue could be felt to be greatly swollen and thick. The floor of the mouth beneath the tongue was elevated to the level of the base of the lower teeth, especially on the left. Well back toward the base there was a definite area of induration.

A diagnosis of lingual abscess was made. Hot irrigations and hot external dressings were instituted and within six hours the patient stated that something gave way and a large quantity of foul pus was expectorated. Immediate relief from the preëxisting symptoms followed. Within twenty-four hours the tongue had subsided almost to normal, the fever had disappeared, and the patient was able to take food. At the end of two days he was dismissed to return home.

CONCLUSIONS

Lingual abscess should be considered in all cases of painful swallowing and movement of the tongue.

Lingual abscess responds readily to treatment by hot irrigations.

Surgical drainage of lingual abscess should be established from within the mouth rather than from outside.

REFERENCE

- Bennett, A. B.: Glossitis: A study of the literature from 1816 to 1906 and report of a case. Wash. M. Ann., 1906-07, V. 267-278.

EXCERPT FROM ADDRESS OF JULIUS RILUS EASTMAN

The African in his native country is practically immune from cancer; but observing him after he has become a part of our civilization in the United States, we note that he is not infrequently the victim of cancer. However, owing to the fact that in America he still retains some of the languorous, care-free habits of his original habitat, he is less frequently attacked by cancer than his strenuous white neighbors. Sir Arbutnot Lane, speaking particularly of Jamaica, says there is no cancer among the people of the West Indies excepting in the whites and among those blacks who have adopted the habits of civilization.

MEDICAL HISTORY

SOME INCIDENTS IN THE LIFE OF SIR JAMES PAGET (1814-1899)

BY WILLIAM P. COUES, M.D.

For the medical man, be he internist, surgeon or, last but not least, general practitioner, there exists no more fascinating book than the Memoirs of Sir James Paget, edited by his son, Stephen. The delightful style of the memoirs is strongly reminiscent of the great Russian Pirogoff's "Tag Buch," and, like him, a long struggle due also largely to parental financial reverses was endured for years, before that success was obtained which nothing in the way of human difficulties and discouragement seemed able to stop.

It is more than a coincidence that we find in studying the early lives of the great surgeons of the past that many showed a deep interest in, and became known as profound students of different branches of natural history.

Sir James was born at Yarmouth in 1814, many remembering, perhaps, that this town was the place where so many of the incidents of Dickens' "David Copperfield" took place, and especially that graphic and terrible pen-picture of the wreck on Yarmouth beach, which for vividness and thrilling reality has probably never been equalled.

During his apprenticeship to Mr. Charles Costerton at Yarmouth, he became deeply interested in botany and zoology, and Saturday afternoons were given to collecting along Yarmouth beach and elsewhere, he finally publishing with his brother Charles "The Natural History of Great Yarmouth." He says, "I think it impossible to estimate too highly the influence of the study of botany on the course of my life."

In his first year at St. Bartholomew's Hospital, 1834, Paget discovered the trichina spiralis. He tells us that, "My share was the discovery of the 'worm' in its capsule, and I may justly ascribe it to the habit of looking out, and observing, and wishing to find new things, which I had acquired in my previous studies of botany. All the men in the dissecting rooms, teachers included, 'saw' the little specks in the muscles: but I believe that I alone 'looked at' them and 'observed' them: no one trained in natural history could have failed to do so."

For years after his hospital course Sir James' meagre income was largely derived from his writing and reviewing for medical journals and his position as curator of the anatomical museum. He says, "During the first seven years after obtaining my diploma, my largest income from practice was £23-13s and till I had been a surgeon for 14 years it had never exceeded £100." From the beginning of the Cavendish Square days operations and consultations multiplied rapidly, until the income was somewhat commensurate with what it should be.

Among the most interesting of his lectures on pathology are those concerning the morbid

processes in plants, particularly those produced by parasites. He alludes to the growths in plants "which may be deemed most nearly like tumors," particularly the so-called exostoses. In this continued growth, when encapsulated, they resemble the typical tumors of our pathology more than do any other morbid growths on plants, and they may continue to grow so long as nutritive material is supplied to them. . . . Surely they thus confirm that theory of tumors which regards those whose structure does not differ widely from the natural structures, as growths derived from portions of germinal substance remaining, though one knows not why, for years 'lethargic,' and then becoming active, growing in their own method, and subsisting on materials derived from the living parts around them."

At the age of 64, in 1878, he writes his brother for his advice with regard to giving up operating. He is only working 15 or 16 hours a day at this time. He tells his brother that . . . "It would be a great grief to me, if I were to do mischief through being less clear sighted, or even less dextrous than I have been. . . . My impression is that it might go like a detached bit, and leave the rest unchanged." Sir James' impression proved correct, for after giving up operating his consulting practice was even greater than before, a fact rarely observed in the lives of other great surgeons.

Of the many articles from his pen, the two which caused him to be most widely known to posterity were those on "Disease of the Mammary Areola Preceding Cancer of the Gland," published in 1874 in the St. Bartholomew Hospital reports, and "On a form of chronic inflammation of the bones (osteitis deformans)," published in 1876, in the transactions of the Med. Chir. Society. His pen was active for 60 years, his first article on "The Natural History of Yarmouth" being published in 1834, and his last, an address to the Abernethian Society at the beginning of its hundredth session in 1894, when he was 80 years of age.

In a list of only the chief articles written, we find 120, covering the widest possible range of surgery, medicine, pathology and physiology.

The outstanding impression given from his memoirs and his more intimate letters is that of his deep religious sense, absolute fairness, and gentleness, and an abiding regard for, and interest in, all students of medicine.

To the young surgeon of the present day, born without a silver director in his mouth, not the distinguished seion of extinguished surgical forebears, Sir James' life bears a particular message, in the thought that if the science and art of surgery are loved enough, ultimate success and distinction will be certain, no matter what the worldly handicaps may be.

**Case Records
of the
Massachusetts General Hospital**

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED IN
WEEKLY CLINICO-PATHOLOGICAL EXERCISES

EDITED BY

RICHARD C. CABOT, M.D., AND HUGH CABOT, M.D.

F. M. PAINTER, A.B., ASSISTANT EDITOR

CASE 11081

MEDICAL DEPARTMENT

An American watchman of sixty-two was brought to the Emergency Ward December 15 unconscious, with left facial palsy. Next day he was only slightly disoriented and confused,—a stolid man with a tendency to drop asleep while being questioned. The history is not reliable.

F. H. His father died at thirty with "rheumatism around the heart."

P. H. He had pneumonia at forty. For two years he had had "sciatic rheumatism" in the knees. Both ears had been deaf, for how long he did not know. His bowels had been constipated for five years. For three months he had been dizzy on standing up. His memory was rather poor. Thirty years ago he weighed 170 pounds, his best weight. He thought he weighed at present about 130. There had been no recent loss.

P. I. Two years before admission he had a shock—severe headache in the frontal region and the top of the head, and numb prickling sensations in the right hand. He did not lose consciousness. The headache lasted a week. Ever since that time he had been troubled with very frequent severe headaches of the same kind. The numbness and tingling of the right hand had never left him. He thought the hand had been getting weaker. Four months after the first attack a physician told him his blood pressure was 250. Beginning four months ago he had had nycturia at first four, at present three times. For three months he had had some dyspnea on exertion and some dizziness on standing up and walking about.

P. E. Rather poorly developed and nourished. Nauseated. Apex impulse of the heart not recorded. No enlargement to percussion or other abnormalities recorded. *B. P.* 210/150-220/150. *Lungs* normal. *Abdomen.* Liver three finger-breadths below the costal margin. Edge felt. A pulsating tumor which felt like an artery just to the right of and below the umbilicus. Right inguinal wide, with abnormal impulse. *Rectal examination.* Right lobe of the prostate greater than the left, smooth. *Pupils*

ovoid, left greater than right; both reacted through a small arc. *Reflexes* normal. Left grip weaker than right.

T. 98.4°-101°. *P.* 58-100. *R.* 9-22. *Urine.* Normal amount. A very slight trace of albumin at two examinations, sp. gr. 1.016-1.022, leucocytes at both, occasional red blood cells at the second. *Renal function.* 20 c.c. on time. In two hours 0%. *Blood.* Hgb. 75%, leucocytes 10,300-7,600, polynuclears 88%, reds 4,840,000, considerable achromia, a few tailed forms. *Wassermann* negative. *Non-protein nitrogen* 37 mgm. *Vomit.* Guaiac strongly positive.

Orders. December 15. Soft solids. Many blankets. Hot water bag. December 16. Caffein sodium salicylate gr. xv intramuscularly if respirations go below 10. (Not given.) December 21. Caffein sodium salicylate gr. xv intramuscularly at once and repeat in one hour if respirations do not improve.

The patient became more stuporous and complained of severe headache. The night of December 16 he had a generalized convulsion. Lumbar puncture gave 15 c.c. of grossly bloody fluid under normal pressure, dynamics normal, 91,600 red cells, 362 leucocytes, total protein 160, Wassermann negative, goldsol 222232211. December 19 he seemed brighter. The morning of December 21 immediately after having complained of right temporal headache he became comatose, with very slow respiration, and soon died.

DISCUSSION

BY DR. RICHARD C. CABOT

NOTES ON THE HISTORY

The knee is an unusual place for "sciatic rheumatism."

The only suggestions we have from the past history are of an arteriosclerotic process such as accompanies hypertension, in the dizziness, the poor memory, the gradual loss of weight, and the cerebral accident which seems to have brought him to the hospital.

The present illness confirms what we had guessed from the past history. Everything seems, so far as I can see, to centre around hypertension. We know now that he has had hypertension. We guessed it before.

Headaches do not ordinarily come with simple arteriosclerosis, but they do come with the arteriosclerosis associated with hypertension, with or without nephritis.

I call attention to the value of the blood pressure test here. Examining the man without a blood pressure machine one would say, "a normal heart." Nothing is found, no enlargement to percussion, nothing wrong on auscultation, and yet a very essential lesion is revealed by blood pressure measurement.

Last week at another hospital I ran into the

first case I have ever seen in which the patient had a prolonged, obvious, extreme hypertension (over 200) lasting for months and which came to necropsy with a small heart. I wish I were sure that that was so. I could not help feeling that perhaps they had swapped the heart or something. If that is a not infrequent occurrence I have to revise all my ideas. If this heart turns out to be small, I shall be in a dilemma.

NOTES ON THE PHYSICAL EXAMINATION

1. An artery has no right to be in this position in the belly wall unless as a collateral circulation, to make up for some obstruction, and that ordinarily is venous and not arterial. So I have nothing to say about this artery. It is a mystery to me.

2. "Left grip weaker than right" is strange, because the right hand is the one which has been affected, and which has been said before to be weak.

3. We have a moderate range of temperature within six days, as he died on the 21st.

4. The non-protein nitrogen, 37 mgm., is extraordinary in view of a kidney function of zero.

5. I do not see anything about passive congestion. The lungs are normal. There is nothing about edema of the legs or ascites. So that we cannot say that passive congestion has anything to do with this, as I see.

6. A PHYSICIAN: What do you understand by the positive guaiac?

DR. CABOT: I do not think that is of any particular importance. We do not know anything about the question of piles or about his diet.

A PHYSICIAN: Wouldn't it mean congestion of the gastro-intestinal tract?

DR. CABOT: It might mean that, but with the absence of passive congestion anywhere else and with no knowledge about his diet and about the condition of the rectum, I should not think that would be the best inference.

7. The orders are not particularly important.

8. They seem pretty sure that they did not introduce that blood in the process of making the lumbar puncture but that it was there, and therefore they must have thought that he had cerebral hemorrhage. The count of reds and leucocytes does not make much difference where there is so much blood.

DIFFERENTIAL DIAGNOSIS

The thing for which we have most convincing evidence, I should say, is cerebral hemorrhage. The symptoms point to it, the lumbar puncture points to it. He has not had paralysis, it is true. That is perfectly possible if the trouble is at the base or in one of the silent areas of the brain.

What else has he besides cerebral hemorrhage? Back of cerebral hemorrhage ordinarily there is arteriosclerosis of the cerebral vessels. I suppose it will be found here. Back of a high blood pressure such as he has been said to have

there is ordinarily a hypertrophied and dilated heart, as I have said, and I suppose that will be found here. There is nothing to indicate any trouble in the valves or in the pericardium. There should be a big heart and nothing else.

I am in some doubt about his kidneys in spite of the zero function, which seems as if it would settle it. There is nothing else which would make us think of nephritis. The non-protein nitrogen is not high, he shows considerable power to concentrate urine, and he has had no distinctive "uremic" manifestations (if there are any such). On the whole I should say we probably shall find extensive kidney damage, because I have never known a zero function to come without kidney damage. Do you agree, Dr. Young?

DR. YOUNG: With one exception, and that is in obstructing prostate where the obstruction has gone to the point of knocking the red test almost flat and not raising the non-protein nitrogen very high. That is the one condition where I think the prognosis with a zero function may be good. On the other hand where we have a zero function and the non-protein nitrogen goes steadily up it is a fatal prognosis. That is the only condition I can imagine with a zero function and still potentially fair kidneys.

DR. CABOT: We have no edema of the tissues to slow up the rate of absorption here, and there is nothing to suggest prostatic disease. So I think we must attribute a good deal of importance to that function, though one always hesitates to put a great deal of weight on one fact when the other facts seem to contradict it. There was just one test, done five days before death. One is never at all comfortable in making any diagnosis on a single test, yet the probabilities are rather greater than the opposite that he may have extensive kidney damage.

Outside of the heart, the kidney and the brain, which we have discussed, I see no reason to suspect any other organ. I should say the essential lesion is his hypertension, and everything else might perfectly well be secondary to that.

A PHYSICIAN: How often would a hypertensive heart be normal to auscultation?

DR. CABOT: Fully half the time, I should say, perhaps more than that. We may get a little systolic murmur. Perhaps one should not say that that is normal. But it has no particular connection with the hypertension. We might get a little sharpening of the second sound, which we often get in old people without hypertension. So I should say that we often get the hypertrophied heart without any symptoms which we can attribute to it and without any changes of importance in the physical examination.

CLINICAL DIAGNOSIS (FROM HOSPITAL RECORD)

Cerebral hemorrhage.
Hypertension.
Arteriosclerosis.

DR. RICHARD C. CABOT'S DIAGNOSIS

Cerebral hemorrhage.
Arteriosclerosis.
Hypertension.
Hypertrophy and dilatation of the heart.
Chronic nephritis?

ANATOMICAL DIAGNOSIS

1. *Primary fatal lesion*

Arteriosclerosis.
Cerebral hemorrhage.

2. *Secondary or terminal lesions*

Hypertrophy and dilatation of the heart.
Edema of the lungs.

3. *Historical landmarks*

Chronic pleuritis.
Obsolete tuberculosis of the bronchial glands.

DR. RICHARDSON: The vessels of Willis and the remote branches showed marked arteriosclerosis. One of the vessels of Willis, the middle cerebral on the right, showed the condition markedly and disappeared on the border of a large area of hemorrhage. It might very well be in this case the artery of hemorrhage. In the left lateral and the fourth ventricles there was a small amount of blood and blood clot. The right ventricle had practically disappeared, and in its place was a large mass of disintegrated brain tissue and blood clot. This extended through on the right nearly to the cortex of the temporal sphenoidal lobe anteriorly, but not quite through. It had disintegrated the basal ganglia on the right and extended into the region of the internal capsule,—a large hemorrhage for no more definite paralysis clinically. The sinuses, middle ears, pineal and pituitary glands were negative. A frank cerebral hemorrhage, presumably originating in the right middle cerebral or a branch of it.

There were a few pleural adhesions on the left. On the right the lung was bound down by old adhesions. One or two of the bronchial glands showed fibrocalcereous degeneration,—obsolete tuberculosis. There was some edema of the lungs.

The heart weighed 440 grams,—considerable enlargement for him. The right ventricle wall was three mm., the left fourteen. That is an increase in the thickness of the left ventricle. The cavities were full-sized, the valves frankly negative. The coronaries were free, capacious, and showed a slight amount of fibrous sclerosis. The aorta and great branches were free and capacious, the ascending thoracic circumference eight cm., the descending seven and a half, the abdominal six. The aorta and branches showed marked fibrous and fibrocalcereous sclerosis. The circulatory apparatus elsewhere was negative.

The liver showed some congestion. The spleen weighed 125 grams and was negative except that there was some prominence of the trabeculae and of the cut ends of the arteries.

The kidneys combined weighed 250 grams and showed some arteriosclerosis but no definite nephritis.

DR. YOUNG: Was there any prostatic enlargement?

DR. RICHARDSON: No.

DR. JAMES H. MEANS: How much fibrosis is there in the smaller vessels in the kidney and the heart? Is there marked arterial thickening? Is it one of those states that has been called diffuse arterio-capillary fibrosis?

DR. RICHARDSON: Not considerable enough to call it arteriosclerotic nephritis. But here and there was sclerosis of the arteries and a few scattered foci of atrophy.

DR. CABOT: It is the sort of kidney you have often reported here in connection with perfectly good renal function. In the diagnosis written during life they did not consider the kidney in any way. How they were so wise as to know that they were to disregard that kidney function I want to know. How did you know enough to throw that out?

DR. MEANS: I do not know the argument on this. I did not see the patient during life. However, I think it is never wise to make a diagnosis on a simple red test. We should pay more attention to abnormal non-protein nitrogen.

DR. CABOT: Do you suppose someone forgot to put in the alkali?

DR. MEANS: I don't believe so.

DR. YOUNG: I do. I have never seen the red test tell a lie. I think it was zero due to some technical error, just as I think it could be zero due to prostatic obstruction. There are times when we get a zero test when the kidneys are good, but there is a reason for it.

DR. MEANS: We get it with decompensated cardiacs.

DR. CABOT: We get it low, but not zero. This is the first kidney I have seen where they thought it was only arteriosclerotic, not nephritic, with a zero function. That they should not even consider the kidney here, or show any signs of uncertainty, seems to me very queer. It is conceivable that that did not get reported until late, or something like that. But it floors me. I am glad to have a little company, Dr. Young.

DR. YOUNG: I still stick by it.

CASE 11082

MEDICAL DEPARTMENT

A teamster of twenty-five entered July 24. Five years before admission he had gonorrhea. Seven months before admission he had pleurisy and pneumonia followed by rheumatism in the shoulder, knees and feet. He was in a Boston

hospital for two months. A month after leaving the hospital he noticed shortness of breath, palpitation, and cough with frothy sputum, occasionally accompanied by attacks of vomiting. Three weeks before admission he noticed swelling of the feet, two weeks later swelling of the abdomen. The symptoms gradually increased until the day before admission, when he suddenly became much worse and on reaching home had to go to bed. The chief complaint was dyspnea. He was also troubled with a feeling of distension in the upper abdomen. The night before admission he was not able to lie down, and slept very little. His appetite was poor. In the past twenty-four hours he had taken only milk.

Examination showed a well nourished man with brownish-yellow skin and pale mucous membranes. The apex impulse of the heart was in the sixth space four and a half inches to the left of the median line. The right border of dullness was two and a half inches to the right. The sounds were somewhat weak, the action regular. The pulmonic second sound was accentuated. In the aortic area and over the third and fourth left cartilages was heard a high pitched diastolic murmur. The pulse was regular, of large volume, and ill sustained. There was capillary pulse. Pistol shot was heard in the groin. The systolic blood pressure was 160. The lungs were negative except for an occasional sonorous rale. The abdomen was tensely distended in the lower portion, soft above the umbilicus. There was considerable tenderness in the right upper quadrant. There was a fluid wave. The liver dullness extended from the fifth space to two inches below the ensiform in the median line, where the edge was felt. There was considerable edema of the legs. The pupils were normal, the knee-jerks lively. The temperature was 97.9° to 102°, the pulse 81 to 130, the respirations 24 to 50. There were fourteen to seventy ounces of urine daily, the specific gravity 1.013-1.016, turbid at one of three examinations, high colored at the other two, a slight trace to a trace of albumin at all. At the single sediment examination there were a few abnormal red blood corpuscles. The hemoglobin was sixty-five per cent., the leucocytes 8,700. The fundi were normal.

The dyspnea continued severe through the day of entrance. Afterwards it diminished. The fluid in the abdomen increased through the day of entrance, but two days later was somewhat less. The chief complaint July 26 was hemorrhoids, which were tense and thrombosed. The heart action was much stronger. A marked presystolic murmur was heard at the apex. July 29 the hemorrhoids were incised with ethyl chlorid and clots partially removed. After this the patient complained less of pain. By August 1 the presystolic murmur had disappeared at the apex. The diastolic persisted, and a marked systolic

was heard in the aortic area, transmitted to the neck. The dyspnea and cough were less. The patient was constantly drowsy and complained of weakness. The following night he had an attack of nausea and repeated vomiting. The fluid in the abdomen increased. Under digitalis the condition rapidly improved until the night of August 10, when the dyspnea became severe, somewhat relieved by oxygen. Edema of the legs and scrotum, dyspnea and malaise increased. He had discomfort in the epigastrium, pain in the left shoulder radiating down the left arm, and numbness in the left hand. August 19 Southey's tubes were inserted in the left leg. They failed to withdraw much fluid. The next day the respirations became considerably more rapid and the pulse and temperature rose. The patient became delirious. The morning of August 21 he died.

DISCUSSION

BY DR. MAURICE FREMONT-SMITH

NOTES ON THE HISTORY

The story is that of a failing myocardium, dyspnea, edema of the feet, and later ascites, discomfort in the epigastrium, probably from engorgement of the liver.

We wonder whether the gonorrhea might have been a factor in his heart condition, and whether the so-called "rheumatism" in the shoulder, hands, and feet might be gonorrheal. Five years between the attack of gonorrhea and the inception of symptoms is a long time, much longer than usually occurs. We are taught, of course, that gonorrheal arthritis is a mono-arthritis, but this is not strictly so. There is usually one joint, usually a large joint, that is chiefly involved, but careful examination will usually show a polyarthritis in gonorrhea. It is apt to come on, however, during an active stage of the gonorrhea, that is, during the discharge or with the occurrence of a vesiculitis or an epididymitis. I think I am right, Dr. Young?

DR. YOUNG: I think that is true.

DR. FREMONT-SMITH: I think five years without any symptoms would probably rule out gonorrhea as a factor.

DR. YOUNG: The gonococcus is not supposed to last over two years from the time of infection, even with poor treatment, in the average case.

NOTES ON THE PHYSICAL EXAMINATION

DR. FREMONT-SMITH: Pigmentation of the skin must be always considered. In this case it is quite possible that the liver engorgement has interfered with the normal excretion of bile and that we have a jaundiced man or a man who is recovering from jaundice. We are apt to overlook pigmentation, but it may put us on the track in rare diseases like Von Recklinghausen's

and hemachromatosis, and of course in pernicious anemia, syphilis, and Addison's anemia.

In a man of twenty-five the pulmonic second should be about equal to or a little less loud than the aortic. The mere fact that one of the two sounds is louder than the other does not mean that it is accentuated. Here the statement is made that it is. We do not know.

The diastolic murmur is the murmur of aortic regurgitation.

While we are not told the diastolic blood pressure it would be very interesting.

MISS PAINTER: It was not taken. This is a very old case.

DR. FREMONT-SMITH: Assuming that this is a case of rheumatic heart disease, there is very much too much damage in this heart for a seven months' duration. If we assume that the etiology in this case is not gonococcus and is not syphilis and is rheumatic we have to assume that this man had a recurrence of his rheumatic symptoms seven months before his admission, and had had previous infection, chorea or a tonsillitis or rheumatic fever, or possibly no demonstrable lesion excepting an infection of the endocardium.

The specific gravity of the urine shows little change. If it were a little higher, if it were stationary between 1.018 and 1.024, we should say, "That is what we expect with cardiac decompensation with engorgement of the kidneys." If it were lower we should say the kidneys were essentially involved. Here I do not think it helps us much. The mention abnormal red blood corpuscles is interesting, especially as we are not given a blood smear. A diagnosis of pernicious anemia may sometimes be made by examination of the urinary sediment and finding abnormal large red cells. I should like to know whether a smear was taken or whether it was left out on purpose.

MISS PAINTER: No smear was taken.

DR. FREMONT-SMITH: I should think that on finding them in the urine the next step would be to find out what they looked like in the smear.

Evidently diuresis was increased to a perfectly reasonable amount of urine.

A 65 per cent. hemoglobin does not at all rule out pernicious anemia. The leucocyte count of 8,700 is a little against it. We should expect a lower leucocyte count. Here however we probably have not got to consider that condition because we have enough in the heart.

The presystolic murmur was not heard before, possibly owing to the fact that the heart was working poorly.

The disappearance of the presystolic murmur is a very interesting observation. Of course it may have been an Austin Flint murmur. I should like to ask Dr. Cabot whether such a murmur would be more likely to disappear than the murmur in mitral stenosis?

DR. CABOT: I think it is not so apt to disap-

pear. It is more fixed. The murmur in mitral stenosis comes and goes, I should say, more than the other.

DR. FREMONT-SMITH: There is no mention made of thrill, and although we can assume that the aortic valves are roughened, I think without a thrill we cannot make a diagnosis of aortic stenosis.

I should like to know how much digitalis they gave. Here is a case with a normal rhythm in which digitalis apparently gave a very great relief.

DR. CABOT: Ten minims twice or three times a day.

DR. FREMONT-SMITH: Then there was probably some other factor than digitalis, as is often the case.

DR. CABOT: He also had some tincture of strophanthus, ten minims twice a day. That was at an earlier time. These were the good old days. I don't think it would do him a bit of harm or good.

DR. FREMONT-SMITH: Pain is a little more difficult to explain if we assume that it is rheumatic than if we say that the aortic regurgitation is due to syphilis, where the lesion progresses up the aorta and to the coronary vessel.

DIFFERENTIAL DIAGNOSIS

The question why cardiac patients become dyspneic is always an interesting one. Of course we know that in cardiac disease the vital capacity is decreased. Peabody has shown that, and Drinker has done recently an experiment in which he put a clamp on the pulmonary vein of the cat and was able to show that the amount of air that can be put into the lungs under known pressure was decreased. That is, without any other factor than simple engorgement of the vessels of the lungs the vital capacity was very much decreased. One explanation for this is that when the pulmonary capillaries are engorged the lung tissue loses its elasticity, and consequently one has a mass of stiff tissue which does not expand as well, open up as well, allow as much air to enter, as the normal lung. Another explanation that has been put forward is that the actual volume of air-containing cells of the alveoli is decreased in the lung by the space taken up by the many encroaching capillaries. And then of course we know that in advanced cardiac failure there is a perfectly good reason for further decrease in the vital capacity. When we have fluid in the lung bases there is less space to spread in. Also when there is fluid in the pleural cavities the lung is decreased in size.

There are other considerations which enter this subject of dyspnea. We know that in certain conditions the amount of air breathed must be increased. One of these is an increase in the basal metabolism. We have found that in compensated cardiacs the basal metabolism is not changed. But in almost all decompensated car-

diaes the basal metabolism is increased. On the other hand, there have been found a few cases of wholly decompensated cardiaes in whom the basal metabolism is not increased. If we assume that it is increased, of course the volume of air breathed per minute must be greater than usual, because the amount of oxygen used and the amount of carbon dioxide formed is much greater, as much as to forty or fifty per cent., but it unfortunately is not constant. Cases have been found in which it was normal or just below normal.

The question of acidosis has been brought up. Is the decompensated cardiac acidotic? In other words, are the non-volatile acids in the blood increased? If the non-volatile acids are increased, and if the carbon dioxide in the blood remains the same, the total acid would be very much increased, and that the organism cannot stand. Therefore when the total acid begins to increase the respiratory center is stimulated, the breathing is made more rapid, the carbon dioxide tension in the alveoli is decreased and the carbon dioxide in the blood immediately diffuses through, and therefore we find in a case of acidosis that although the non-volatile acids are increased, the carbon dioxide in the blood is decreased *pari passu*, so that the total acid in the blood remains constant. That is the reason we can measure the acidosis by the lowering of the CO_2 tension.

In decompensated cardiaes there is no acidosis. In nephritides, especially those with uremia, there is a very definite acidosis. There would be good reason therefore for the nephritic to breathe more rapidly. That is, his respiratory center would be stimulated to increase his lung ventilation. But there is no reason in cardiaes.

There is one other factor that has to be thought of, and that is the absolute decrease in the rate of the circulation. It is not only the CO_2 tension in the lungs but the speed with which it can be brought to the lungs and oxygen absorbed that is important. Of this we know very little, but it stands to reason that with a marked mitral stenosis probably less blood per minute might enter the lungs than in the normal.

As regards the diagnosis here, I think we shall find an enlarged heart with mitral and aortic lesions, probably rheumatic. We may find a little increase in the pericardial fluid, possibly some evidence of pleural effusion. We shall find an enlarged and engorged liver, the evidence of passive congestion of all the organs, ascites and edema. We may find an area of bronchopneumonia as a terminal event.

DR. CABOT: May I ask Dr. Means a few questions? Does fixation of specific gravity as we occasionally see it in high figures, twenty to twenty-two,—does that mean anything?

DR. MEANS: I do not know how to interpret high fixation. I do not know whether it means

pathology or not. I should be inclined to doubt it. It seems to me when there is really renal incompetence and fixation due to that, it will be at a low gravity. The whole conception of fixation is that the damaged kidney to complete its twenty-four hour duty has to work continually at top speed because its capacity is reduced.

DR. CABOT: Low fixation, I suppose, means that the kidney has lost the power to concentrate.

DR. MEANS: Yes.

DR. CABOT: Another thing I want to ask is what you think about vital capacity measurements? I have not seen them in the records of any cases coming here. Do we use them?

DR. MEANS: Yes, we use them frequently, but not routinely. We make them in certain cases in which the vital capacity may give information that may enlighten us about the progress.

A PHYSICIAN: Do you think there was evidence of acute endocarditis here?

DR. FREMONT-SMITH: No, I don't think there is any evidence of acute endocarditis. I think he died of cardiac failure.

DR. MEANS: There is one point in connection with dyspnea. Cardiac dyspnea, as I see it, is largely understandable on the hypothesis that the patient has a very marked limitation of his powers for pumping air, and at the same time is called upon to pump more air than he would if he were not sick. One of the things that increases the need of air-pumping is slow blood flow. That in itself is a direct call for an increased pumping of air, because if the blood flows more slowly CO_2 will pile up unless pulmonary ventilation is increased. Combined with that the increased amount of blood in the chest limits the capacity of the bellows, just as though we had an ordinary bellows and put it partly out of business by partly filling it with water.

DR. FREMONT-SMITH: What is the difference in the blood flow in cardiac decompensation?

DR. MEANS: Dr. Newburgh and I made some measurements ten years ago by a rather unsatisfactory method, and yet I believe our results may be somewhat near the truth. In mitral stenosis we found in the neighborhood of two liters a minute instead of five, or less than half the normal.

DR. HENRY FIELD, JR.: Meakins and Davies found reductions by their method. We have very few figures on cardiaes.

DR. MEANS: That means that the venous blood in these people is very, very venous, and to correct this we have the extra air pumping. Then furthermore the slow blood flow introduces the factor of more blood in the lungs and sometimes edema interfering directly with the exchange of gases in the lungs. And we know that if blood reaches the respiratory centre improv-

erly aerated, that in itself is a direct stimulus to extra breathing.

CLINICAL DIAGNOSIS (FROM HOSPITAL RECORD)

Aortic regurgitation.
Hemorrhoids.

DR. MAURICE FREMONT-SMITH'S DIAGNOSIS

Chronic endocarditis, aortic and mitral.
Aortic regurgitation.
General chronic passive congestion.
Hypertrophy and dilatation of the heart.
Possibly bronchopneumonia.

ANATOMICAL DIAGNOSIS

1. *Primary fatal lesion*

Chronic endocarditis of the aortic valve with regurgitation and probably some obstruction.

2. *Secondary or terminal lesions*

Hypertrophy and dilatation of the heart.
Septicemia, pseudopneumococcus.
Lobar pneumonia of upper lobe of right lung.
Chronic passive congestion of the lungs, liver and spleen.
Anasarca.
Ascites.
Hydropericardium.
Edema of the kidneys.

3. *Historical landmarks*

Small accessory spleen.
Arteriosclerotic patch in aorta.
Infarcts of the spleen and kidneys.

DR. RICHARDSON: There was no definite hydrothorax. On the left side there was a small amount of thin pale clear fluid in the pleural cavity, on the right a small amount of cloudy fluid and fibrin and a thin coating of exudate. The lungs generally showed chronic passive congestion, but the upper lobe of the right lung, about two-thirds of it, showed frank pneumonia. The organism is what is now known as the streptococcus mucosus capsulatus. This was one of the first cases in which I recovered it from a case of pneumonia.

The heart weighed 778 grams,—markedly enlarged. The only lesions on the valves were those of the aortic valve, where there was a polypoid mass of chronic endocarditis.

In the spleen and the kidneys were infarcts. The liver showed chronic passive congestion. The kidneys, although they weighed 415 grams, which of course is a considerable weight, showed nothing but edema, no evidence of any glomerulonephritis.

I recovered from the heart blood the organism mentioned above.

DR. CABOT: Will you read us a little more about the aortic valve?

DR. RICHARDSON: In the situation of the free

edges of the cusps and at their points of junction there is a row of irregularly rounded yellowish tag-like masses, the largest about one cm. in greatest dimension. At one point there extends down from the junction of two of the cusps on to the endocardium a grayish-yellow, fibrous, somewhat shaggy, firmly adherent patch of material. The material of these masses in the situation of the aortic cusps is slightly soft in places, but on section it is in many places finely calcareous in character.

DR. CABOT: So that is all chronic, no acute?

DR. RICHARDSON: Yes, all chronic. There was some question, but the histology showed the same thing.

DR. CABOT: Was there any stenosis?

DR. RICHARDSON: The circumference was eight cm.; no stenosis in one sense, but the mass when the valve closed would leave less room for the blood to go through.

DR. CABOT: He probably had trouble both ways then,—stenosis and regurgitation.

DR. FREMONT-SMITH: What can we call the etiology? This is not a typical rheumatic chronic endocarditis.

DR. RICHARDSON: Yes, I should think it was rheumatic chronic endocarditis.

CASE 11083

SURGICAL DEPARTMENT

First entry. A five-months-old boy of Russian Jewish parentage was operated upon for ileocecal intussusception, which was reduced. He was discharged well in two weeks.

Second entry. July 25, ten years later.

P. H. He remembered no diseases except frequent colds.

P. I. Twenty-six hours before admission while playing he ran against a gate, striking his left side. He was able to walk home with assistance and went to bed. Pain in the left side persisted, occasionally generalized over the abdomen. Next morning during a few hours he vomited yellowish material eight or ten times. At admission he had eaten nothing since the injury, and his bowels had moved once.

P. E. Well nourished. Drowsy but easily roused. *Abdomen* retracted, rather spastic throughout, generally tender, more so in the left upper quadrant. *Rectal examination* not satisfactory. No other abnormalities recorded. *T.* 97.9°-99.9°. *P.* 80-105. *E.* normal. Amount of *urine* not recorded, sp. gr. 1.018-1.025, other findings negative. *Leucocytes* 19,000-15,800. *Wassermann* negative.

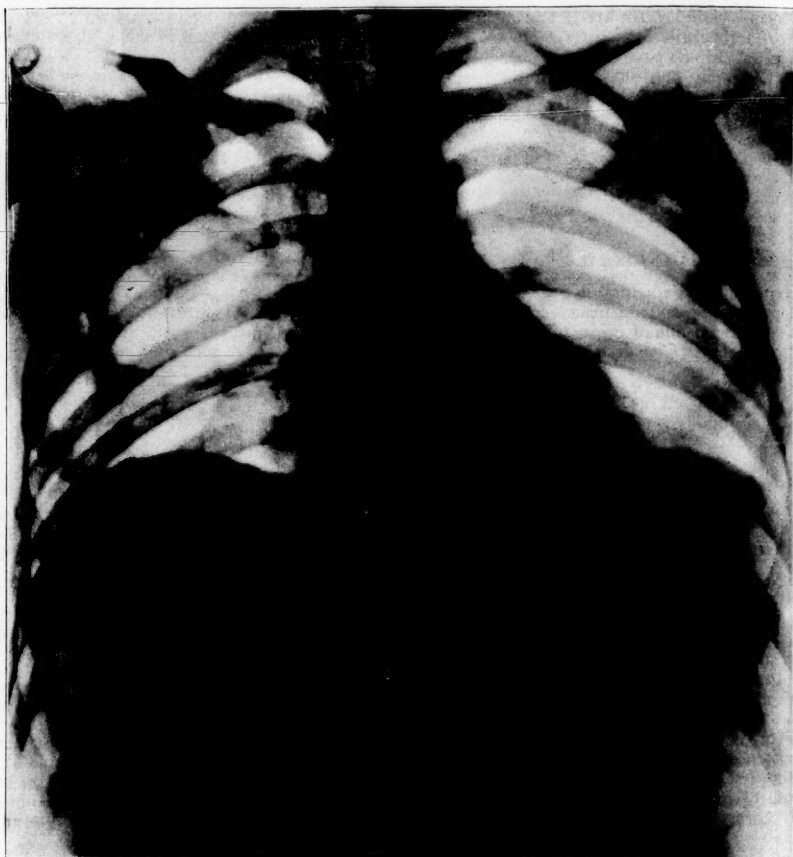
July 28 there was still some abdominal tenderness, most marked in the left upper quadrant, but the boy looked and felt much better.

The vomitus was green, cloudy, negative to guaiac. The abdominal tenderness practically disappeared except in the left upper quadrant where the blow was received. The soreness seemed to be chiefly in the abdominal wall. July 31 he was discharged.

History of interval. August 4 he had severe

audible. No masses and no real spasm, though there was considerable voluntary rigidity which was easily broken through when the patient breathed. *Rectal examination.* Slight tenderness on both sides.

Before operation chart, urine and blood not recorded.



The diaphragm is high on both sides. There is absence of respiratory excursion. The outline of the diaphragm is sharply defined. There is no definite evidence of disease in the chest. The findings suggest a pathological process below the diaphragm.

pain in the left hypochondrium, malaise, and no appetite.

Third entry. August 5.

P. E. As before except as noted. *Abdomen* distended, tympanitic, somewhat tender throughout. Distended gut visible through the thin abdominal wall. Peristalsis palpable and

Operation was done August 5. The patient was in considerable shock, but by August 8 the chart was normal, there was no vomiting, and the bowels were moving well. During the next week there was pain and sepsis in the wound due to a sponge, which was removed August 16. After this the wound healed rapidly. A Wassermann was moderately positive.

August 19 the boy started to vomit, though he was bright and active. The wound remained open superficially, with some sloughing. A second Wassermann was negative. August 25 X-ray showed both diaphragms rather high because of the fact that the patient was lying on his back. The left diaphragm was higher than the right and had no excursion. August 27 (see illustration) the diaphragm was high on both sides. There was absence of respiratory excursion. The hilus outline was sharply defined. There was no definite evidence of disease in the chest. He ran a low grade temperature, had epigastric tumor and tenderness, and lost appetite and weight.

August 27 a second operation was done. He had a rather stormy recovery from operation. On the 29th he was still occasionally vomiting dark brown material. The epigastric tumor seemed to be increasing in size. There was moderate drainage from a catheter in the second incision. Feeding was a great problem in the case. The boy lost weight rapidly. It was questionable whether anything passed the pylorus.

August 30 a stomach wash showed the stomach to be fairly clean. A stomach tube was placed twice, but each time the boy pulled it out after a short stay. After the second insertion he began to take and retain fluids by mouth, getting in twenty-four ounces in seven hours. He was given a high calorie diet. Considerable clear fluid drained from the wound about the catheter. During the next two days the abdominal tumor and tenderness subsided somewhat. September 2 the skin surrounding the wound began to show evidence of possible digestion. The wound, which was sewed up tight, had broken down and contained considerable dirty slough. Very little fluid drained out of the catheter, but clear fluid drained almost constantly from around it. September 3 there was pain and vomiting and the epigastric tumor was more marked. A chemical report upon the fluid drained from the wound was, "Slight trace of starch-reducing ferments." The boy lost weight steadily and for the next week had alternate periods of ingestion of food and absence of pain with disappearance of the epigastric tumor for a day or two, followed by vomiting, pain and mass in the left upper quadrant for a day or two. September 13 he was taking 2000 calories with almost no discomfort or vomiting. A barium X-ray was unsatisfactory because the patient was fed in the ward. The stomach was apparently displaced to the left by an extrinsic mass.

September 17 a third operation was done. Following this the boy retained his food, had no pain, and gained weight and strength rapidly. October 5 he was discharged.

October 23 he reported at the Out-Patient Department in fine condition, having gained much weight.

DISCUSSION

BY DR. CHARLES ALLEN PORTER

This case is a rather peculiar one and did not end in Dr. Richardson's care, so that we shall not know the end result.

Here is a boy coming in twenty-six hours after a moderately severe injury in which he ran against a gate and struck his upper left abdomen. The physical examination pretty definitely throws out any injury to the thorax. Otherwise we should have had some rise in respiration. The vomitus was examined with reference to an injury of the stomach which might cause some bleeding. So that the story is of a boy who ran against a gate and had some rather indefinite and not very severe symptoms localizing in the left upper quadrant. His abdomen was not distended. It was retracted. There was a certain amount of spasm.

The things we should think of would be, first, an injury to the spleen. A boy might rupture his spleen. But with that we should expect some injury to the ribs, of which there was no evidence. There was no evidence of any peritonitis, no distension. The vomiting was rather small in amount. There certainly was no rupture of any hollow viscus, stomach or intestines. He may have had an injury to the stomach, a blow or contusion with perhaps a hemorrhage into the walls, but if so we should expect some symptoms, more rigidity and more bleeding, with a positive guaiac test.

DR. CABOT: Do you know what opinion was held at this time?

DR. PORTER: No, I do not.

DR. CABOT: What do you think was the most reasonable opinion?

DR. PORTER: A moderate abdomen contusion with no evidence of any injury to a viscus or anything serious, or they certainly would not have sent him away in five days.

At the second entry he held his abdomen a little rigid, but when you asked him to breathe the slight spasm disappeared. Before the operation there was no particular record of anything. I do not know about it, but I should imagine they operated with the idea that there was clearly some sort of intra-abdominal lesion which showed itself by distension and by visible peristalsis, probably an intestinal obstruction. The boy was thin, and one could hear and see the intestines working against some sort of obstruction. I should think that in all probability that might have been due to some hemorrhage not recognized before or some contusion of the intestine which went on to form adhesions. Because certainly there was no perforation of the gut. So that we have a plastic obstruction, due either to adhesions or to some interference with the wall of the intestine, which led to vomiting, distension, and visible peristalsis.

DR. PORTER'S PRE-OPERATIVE DIAGNOSIS

Intestinal obstruction due to adhesions or to interference with the wall of the intestine.

PRE-OPERATIVE DIAGNOSIS AUGUST 5

Intestinal obstruction.

FIRST OPERATION, THIRD ENTRY

Ether. A five-inch exploratory incision through the left rectus, the center one inch above the umbilicus. There was a moderate amount of slightly cloudy free fluid in the abdomen. The small and large intestines were uniformly moderately distended and congested. Careful exploration of the small intestine and colon revealed no obstruction. There were numerous discrete pearly white nodules about 2 mm. in diameter scattered through the fat of the omentum and the fat tabs of the intestines. There were numerous glands in the region of the mesentery. Behind the stomach in the region of the head of the pancreas was felt a mass, not hard, which extended forward to the gastrocolic membrane. It was impossible to determine whether this was enlargement of the pancreas or a mass of glands about the celiac axis. It appeared that the nodules in the fat were probably due to fat necrosis. The wound was closed without drainage with considerable difficulty on account of tension.

PATHOLOGICAL REPORT

The peritoneal fat tissue showed focal fat necrosis.

FURTHER DISCUSSION

Those glands had been there, of course.

With the finding of these areas of necrosis and with the symptoms of intestinal obstruction it is very clear that we had to do with a lesion of the pancreas which presented these symptoms coming on extraordinarily late. We should have expected them very soon after the injury. The injury was on the 26th of July. He came in on the 5th of August. He must have had this injury of the pancreas from the very beginning. It is not likely that he simply contused his pancreas a little and that later it began to leak. How sick was that boy when he came back the second time?

DR. G. W. TAYLOR: I did not feel that he was very sick. We felt that he was in much the same condition as before.

DR. PORTER: Exploration was done because they did not dare not to, rather than because there was any particular indication for operation.

I think this is a very unusual case in the delay and in the findings. A contusion of the pancreas which led to some escape of pancreatic fluid, to a moderate degree of fat necrosis, following undoubtedly a trauma. Nothing was

done at the operation; it was simply an exploration.

Why did they again do a Wassermann on this boy?

DR. TAYLOR: I do not know.

DR. PORTER: I cannot see why they were interested in the specific history particularly; but still that is recorded.

DR. HOLMES, will you interpret the X-rays?

DR. HOLMES: The diaphragm tends to float up in a prone position. I saw this boy, so I begin to remember about him a little.

DR. PORTER: He showed emaciation, a high level of the diaphragm on both sides with relatively slight excursion, and a very definite and large abdominal tumor which did not seem to be stomach, because the boy vomited occasionally and once when he came down for an ether examination and had unfortunately had something to eat beforehand we thought he had a big stomach. After a few whiffs of ether he vomited and the thing disappeared. So we had pretty good evidence at that time, we thought, of dilatation of the stomach.

DR. HOLMES: The X-rays were taken just before the second operation.

This plate is taken with the patient lying on his back, the plate behind, the tube in front. He was probably too sick to be examined in the upright position. In that position there is a definite tendency for the diaphragm to rise. The high position of the diaphragm is of course also due to the accumulation of fluid or gas in the abdomen. The lung fields are relatively clear. I suppose they thought of lung abscess or some other condition in the chest. There is no evidence of that. The outline of the diaphragm is sharply defined on both sides. Fluid in the chest or infections in the lung interfere with the sharpness of the outline. The diaphragm is quite sharply domed as though it might be pushed up to the full extent. Infections directly beneath the diaphragm are apt to produce limitation and possible fixation. General infections in the abdomen would produce limitations in movements of the diaphragm. In the absence of any pathology in the chest with a limited diaphragm we are justified in assuming something below it. If there was pus directly beneath we should expect a fixed diaphragm.

This would be interpreted as due to some condition in the abdomen. We have nothing more I think to add except to say that the chest is negative and the limited diaphragm suggests pathology below it, no particular pathology, but more probably inflammatory than neoplastic, because that would not cause limitation.

DR. PORTER: Owing to the abdominal tumor and to the fact that the boy was running downhill, a second operation was done.

X-RAY INTERPRETATION AUGUST 27

The findings suggest a pathological process below the diaphragm.

PRE-OPERATIVE DIAGNOSIS AUGUST 27

Ruptured pancreas with secondary localized peritonitis.

SECOND OPERATION, THIRD ENTRY

Ether. A two-inch incision was made in the midline above the old scar allowing the escape of a very large amount of clear grayish thin fluid. The collection was apparently between the lower surface of the liver and the stomach. An indefinite mass was felt over the head of the pancreas. This incision was closed and another incision was made in the right upper quadrant through the rectus, which allowed the escape of about a half pint of a similar fluid. Examination revealed the same mass in the pancreas and showed that this cavity was in the region of the gall-bladder and limited above by the liver. The patient continued to regurgitate large amounts of black foul material. It was felt unwise, partially on this account, to continue the operation. A soft rubber catheter was placed in the wound to permit drainage and the edges closed with interrupted stitches.

BACTERIOLOGICAL REPORT

Culture from the peritoneal fluid was negative.

FURTHER DISCUSSION

In other words, then, at this second operation the big bulging mass which one could palpate very easily through the abdomen and which caused the diaphragm to go up was nothing more than a collection of fluid between the liver and the diaphragm, and between the stomach, around the gall-bladder and around the liver. So he had two definite sacs of fluid in the abdomen, an encysted sterile peritonitis.

With the history of the original fat necrosis it was pretty obvious that there was some lesion of the pancreas which was allowing pancreatic fluid to escape into the peritoneum, and which instead of being diffuse had in a few days become encysted.

Dr. CABOT: Was this fluid tested at all for pancreatic ferments?

Dr. PORTER: Yes, and was found to contain a trace of starch-reducing ferment. There was a question whether he had some obstruction at the pyloric end of the stomach due to this mass about the head of the pancreas.

We have then alternate distension of the stomach with vomiting, apparently obstruction at the pyloric end of the stomach, with some evidence of something outside of it causing the obstruction.

Dr. HOLMES: I am afraid I cannot say much about the X-ray of September 13. Our gastric interpretation is largely based on fluoroscopic observation. I am quite sure this is the fundus of the stomach. The mid-portion is more or less obliterated by pressure. There

is not enough evidence for me to discuss it at all.

Dr. PORTER: The boy was running down very fast. He could not take any food. Something was forming a tumor in the abdomen. It seemed to vary in size and to push the stomach off to the left.

PRE-OPERATIVE DIAGNOSIS SEPTEMBER 17

Traumatic rupture of pancreas with secondary encysted peritonitis.

THIRD OPERATION, THIRD ENTRY

Ether. Incision in left upper quadrant through rectus. Stomach walled off and retracted downward, exposing a large cystic tumor through the gastrohepatic omentum. After walling off, the cyst was punctured and a large amount of slightly gray cloudy fluid evacuated. Rubber tube inserted into the cavity and walls of the opening sutured as far as possible to the parietal peritoneum.

BACTERIOLOGICAL REPORT

Culture of fluid from pancreatic cyst showed no growth.

FURTHER DISCUSSION

In other words, this boy had an injury of his pancreas from being struck by a gate. It was followed by rather mild symptoms. He was discharged from the hospital, came back five days afterwards still complaining of indefinite tenderness, this time with some distension which he had not had before, most marked in the left upper quadrant. The first operation was an exploration, and nothing was found but a mass in the pancreas and fat necrosis. At the second operation two collections of fluid were drained. The boy went on and on losing weight, having epigastric tumor apparently with more or less obstruction to the stomach, and a third operation was done which showed that there had formed as a result a traumatic cyst of the pancreas which was evacuated and drained, and from that time on the boy did perfectly well.

Dr. CABOT: Why did he get well?

Dr. PORTER: Because, I imagine, there was no particular injury of his pancreas to interfere with his general nutrition except in a mechanical way. This boy was starving apparently because he could not keep anything on his stomach, and when these cysts were drained and the mechanical pressure was removed he could eat. In the second operation we drained them, but not all. The last cyst was apparently one which developed in the pancreas and in the gastrohepatic omentum. It is a very unusual case in that they formed so late.

Dr. CABOT: Do you think it possible that the trauma had nothing to do with it?

Dr. PORTER: No, I don't think so. I think it was definite traumatic pancreatitis. The

thing that surprises me is the long delay. If we have an acute rupture of the pancreas we usually have very stormy symptoms at once. Those patients are operated on, usually for an intestinal obstruction. That is what the symptoms suggest most, and this boy suggested it.

DR. CABOT: Don't you find it hard to make a picture of a gate hitting a boy's pancreas, away inside of him?

DR. PORTER: I should not think so; we find that kind of injury not very infrequently, ruptures of the small intestine at its origin. If the person is set and the muscles are hard the abdominal wall takes the injury. But if the muscles are loose then the blow will go right back to the spinal column. I think trauma of the pancreas is very unusual. Of course pistol or gunshot injury is not so very rare. I have not seen a case of this kind before. That is why I thought it was worth recording.

A PHYSICIAN: Did he have any sugar in his urine?

DR. PORTER: No, no record of it.

DIAGNOSIS, FIRST ADMISSION

Intussusception, ileocecal.

DIAGNOSIS, SECOND ADMISSION

Possible traumatic rupture of an abdominal viscus.

DIAGNOSIS, THIRD ADMISSION

Subacute traumatic pancreatitis.

CURRENT LITERATURE

ABSTRACTORS

GERARDO M. BALBONI	TRACY MALLORY
WILLIAM B. BREED	HERMAN A. OSGOOD
LAURENCE D. CHAPIN	FRANCIS W. PALFREY
AUSTIN W. CHEEVER	EDWARD H. RISLEY
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CHARLES D. LAWRENCE	SHIELDS WARREN
	BRYANT D. WETHERELL

A CLINICAL STUDY OF SOME COMMON ANATOMICAL ABNORMALITIES OF THE COLON

KANTOR, JOHN L. (*Am. Journ. Roent. and Rad. Ther.*, Nov., 1924, xii, 414-430).

Congenital anomalies may be divided into three classes, namely, those incompatible with life, those compatible with life but not with health, and those compatible with life and health under reasonably favorable circumstances. In the domain of the digestive tract, the first group may be exemplified by the condition known as congenital atresia of the bile ducts, the second group by a gastroenteroptosis of high degree, and the third by a redundant colon, which is the subject of the present paper.

The study is based on an unselected series of 62 cases, met with 668 consecutive private patients

complaining of various gastro-intestinal symptoms, who were studied roentgenologically by the barium meal method.

A colonic redundancy may be expressed by simple pleats or reduplications, by kinks or angulations, or by loops or twists. The distal colon is more frequently involved than the proximal colon. Of the various segments of the colon, the pelvic (omega, sigmoid) loop was the seat of the redundancy 27 times in the 62 cases, which makes an incidence of 4 per cent. in the entire number of persons examined. The splenic flexure was redundant in 14, the descending colon in 11, the iliac colon in 9, and the transverse colon in 3 cases.

Symptoms are brought on by strain or injury or by abuse of colon function. Redundant loops are in themselves not necessarily obstructive to the passage of feces, but may become so under certain conditions of localized stasis or sudden changes in posture with or without interference of the blood supply. Constipation and gas distress are the most common symptoms. Pain is almost as common. Volvulus, though rare, considering the frequency of the condition, occurs only in redundant bowels.

The diagnosis is made by roentgen examination. The differential diagnosis is from gall-bladder disease, appendicitis, colon cancer and cardiovascular disease. The therapy consists in restoration of colon function where this is decompensated and otherwise in non-interference. Vicious cathartic and enema habits should be discontinued. Spasticity should be overcome by rest, lubrication and anti-spasmodics. Surgery is not indicated for redundancy as such and should be reserved for superimposed accidents such as twists or torsions.

[H. A. O.]

TREATMENT OF CARCINOMA OF THE ESOPHAGUS BY RADIATION

GREENE, D. CROSEY (*Am. Journ. Roent. and Rad. Ther.*, Nov., 1924, xii, 471-474).

The preliminary diagnosis is made by the history and by means of roentgenoscopy and roentgenograms which indicate the location and, to some degree, the extent of the growth. Esophagoscopy is then done, usually under the anesthesia.

If the lesion shows the gross appearance of carcinoma, radium emanation seeds are inserted into the growth under direct vision. This method of intra-esophageal radiation, while it has not cured any cases, has been the most effective and satisfactory. In cases where the growth is situated just above the introitus of the esophagus in the hypopharynx occasional apparent cures have resulted from this method.

The deep roentgen treatments have in most cases been given in a series of three or four exposures, extending over a period of about a week beginning a few days after the radium treatment and repeated in about eight weeks.

The results thus far have been only palliative, but the improvement in many of the cases had been prolonged for several months.

The operation for gastrostomy is relatively serious and productive of little benefit when practised as a last resort in late cases. It is however comparatively safe and results in marked improvement in general condition and in maintenance of bodily weight and strength when done in early cases. It is recommended that as soon as the diagnosis is made, the taking of any food by mouth is forbidden. With rest and cleanliness of the esophagus thus induced, and the nutrition maintained, it seems reasonable to expect more favorable results from radiation than have as yet been obtained.

[H. A. O.]

SYPHILIS OF THE STOMACH WITH A STUDY OF
TEN PROBABLE CASES

MERRILL, A. S. (*Am. Journ. Roent. and Rad. Ther.*, Nov., 1924, xii, 444-453).

The condition is essentially a late tertiary lesion, probably the result of ulceration due to syphilitic endarteritis or degeneration of gummata, with breaking down and cicatricial contraction. There is secondary sclerosis with deformity. Syphilitic disturbances of the stomach occurring earlier in the course of the infection are not recognized as such and are diagnosed as functional or coincident gastric disease. They are transitory and disappear under treatment.

The symptomatology is very suggestive, resembling benign ulcer with the chemical and roentgen findings of cancer. Its course begins irregularly and tends to become continuous. Pain and distress immediately after food, not relieved by alkalies, aggravated by food, and relieved by vomiting. Appetite good. A progressive course with marked loss of weight unaccompanied by the degree of cachexia and weakness seen with cancer. Palpable tumor is uncommon. Anacidity or achylia is the rule.

The story tends to be shorter than ulcer, but longer than cancer. There is less tendency to periodicity than in ulcer. The symptoms are either constant from the beginning or become constant after a period of a few months of irregularity.

The roentgen findings are marked gastric deformity tending toward one of two types varying according to the location, extent and duration of the deforming lesion. Either a median deformity of the stomach with contraction, sometimes to a distinct hour-glass shape or a deforming contraction of the phloric end extending upward and involving the stomach wall to a variable extent, sometimes extreme, and forming a characteristic "water-bottle" shape.

The possibility of syphilis should be considered in atypical cases and those resisting accepted methods of ulcer treatment.

The diagnosis rests upon history of infection, positive Wassermann reaction, the demonstration of a gross gastric lesion and cure or definite improvement under antisyphilitic treatment. Absence of history or signs of syphilis and a negative Wassermann reaction prove absolutely the specific nature of the condition.

[H. A. O.]

THE ACTION OF ROENTGEN RAYS ON CORNS

PIRIE, A. HOWARD (*Am. Journ. of Roent. and Rad. Therapy*, Nov., 1924, xii, 482).

The author claims that with a single large dose of X-ray the whole corn can be removed in one piece, with no vestige remaining, and leaving a smooth healthy skin. Some patients experience no unusual sensation after treatment, others complain of pain lasting from three days to one week and in some cases quite severe. The corn can be picked off in about a month after the treatment. Proper attention to pressure points in the shoes is essential. Corns removed by this method have not returned after a lapse of a year and a half.

In the abstractor's experience the pain can be eliminated by dividing the dose into three or four visits about a week apart.

[H. A. O.]

URINE AND BLOOD SUGAR

Host of Kristiania (*Jour. Metab. Res.*, Sept-Oct., 1923) similarly regards the time of return of the B. S. to normal as the crux. In all of 27 experiments with 50g. glucose the B. S. had fallen below 0.11% in 2 hours; (this small dose, also advocated

by other students, seems to the reviewer also to be preferable to 100g., because it involves a less violent though adequate load, and because it shortens the period and tests necessary). The renal sugar threshold commanded the notice of this worker also, who reminds us that it may vary, not only during the falling B. S. curve as compared with the threshold during the rising curve, but also during the falling curve in uniform tests in the same person. His findings indicate, like John's, that low thresholds are rather common. He also studied fermentable and non-fermentable carbohydrates in the urine; found the Benedict-Osterberg method for physiological sugar excretion susceptible of a few changes which rendered it more accurate; found that glucose tolerance tests done in the afternoon 3-4 hours p. c. were no different from those done in the morning fasting; found no change of the curve during digestion (vs. theory of interference by external pancreatic secretion) nor after administration of acid (dilute HCL) or alkali (bicarbonate); urged collection of urine samples during period covered by B. S. much more frequently, i. e., every 15 minutes, for the 2-3 hours; found that while the greatest B. S. rise was always in the first hour, the greatest sugar output was as a rule in the third hour.

GLUCOSE TOLERANCE TESTS

JOHN (*Jour. Metabolic Research* 4:255, "Sept.-Oct., 1923," but only recently come to hand) has devoted attention to renal glycosuria, and emphasizes the importance of studying the kidney threshold simultaneously with the sugar in the blood. Incidentally the threshold in normals (47 cases) he finds generally lower than the usual teaching of 0.17%. As to the B. S. he considers the height of the maximum, and also the time of its occurrence (whether at 1/2, 1 or 2 hours), of minor import, believing the sugar content of the fasting and 3-hour bloods to be the basis for decision as to the diabetic status of the individual. In other words, a B. S. of 0.11% or less at 3 hours following 100g. glucose by mouth, excludes diabetes. Explicit diagrams and tables are furnished.

KETOSIS

ALLEN and ERELING (*Jour. of Metab. Res.*, Sept.-Oct., 1923) found that the susceptibility of dogs to ketosis with fasting and phlorizin was not obviously altered by the Eck fistula. The doctrine of the exclusive or predominant formation of acetone bodies in the liver, which seems contrary to the best modern conceptions of metabolism, is therefore not supported by these experiments.

BLOOD PRESSURE OF DOGS

ALLEN (*Jour. of Metab. Res.*, Sept.-Oct., 1923) reports a slight modification of the clinical auscultatory method, which has shown parallelism with a manometer connected with the carotid. He reports that after removal of one kidney and half the other dogs tend to develop arterial hypertension.

ARTERIAL PRESSURE IN THE EXTREMITIES

SCHOTT and SPATZ, from Moritz's medical clinic at Köln, present observations on the circulation of the extremities, especially with reference to the relation of arterial pressure to various postures. In constrained positions, the systolic and diastolic arterial pressure rises in the arms and in the venous system and falls in the legs. The volume variations of the arteries in systole are the reverse. The pulse rate remains chiefly unchanged.

[R. M. G.]

THE BOSTON Medical and Surgical Journal

Established in 1838

Published by The Massachusetts Medical Society under the jurisdiction of the following-named committee:

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SUBSCRIPTION TERMS: \$2.50 per year in advance, postage paid for the United States, \$7.50 per year for all foreign countries belonging to the Postal Union.

Material for early publication should be received not later than noon on Saturday. Orders for reprints must be sent to the Journal office, 126 Massachusetts Ave.

The Journal does not hold itself responsible for statements made by any contributor.

Communications should be addressed to The Boston Medical and Surgical Journal, 126 Massachusetts Ave., Boston, Mass.

PERIODIC PHYSICAL EXAMINATIONS

It is now several years since the desirability of periodic physical examinations of adults, particularly of adults over 40, began to be seriously discussed. Representatives both of the profession and of the laity have agreed on the wisdom of the procedure. Considerable interest has been aroused among intelligent laity in our various communities as to the practical value of periodic physical examinations by such things as the offer of several large life insurance companies to pay the expense of such examinations annually for their larger policy holders, the propaganda in favor of such a routine procedure conducted by great national organizations for the advancement of health, as for example, the Societies for Mental Hygiene and for the Control of Cancer, and the forcefully presented articles and addresses on the value of health examinations appearing in technical and popular magazines.

With so much being done to prepare the way for the widespread application of this health protective measure, but little real progress has been made.

What is the chief reason for this? There is but one answer. The indifference of the medical profession itself! This great movement, at once

a challenge to the capacity of the medical profession for organized progress and a great opportunity to do a piece of constructive public health work, which offers at the same time a legitimate means of extending the influence and practice of the individual physician, is being almost completely overlooked in this state.

It is true that nowhere in the country has the medical profession as a whole thoroughly grasped the significance and promise of this increasing common sense sentiment in favor of a periodic overhauling of the state of efficiency of each individual's bodily machinery, but in many states the medical profession is showing much more interest in the proposal. In the Pacific Coast States interest in the matter among the physicians is keen and active. In Brooklyn, the District or Borough Medical Society has not only vigorously fostered and popularized the idea among the laity, but has set a most excellent example by having the members of the society volunteer to examine each other and has published to the world the physical shortcomings correctible and otherwise that have been discovered among its own membership, thus giving added emphasis to the soundness of that old adage "the proof of the pudding is in the eating."

In Maine the State Medical Society has joined hands with the Maine Public Health Association in urging physical examinations and has prepared and distributed an excellent blank, more simple than that prepared and recommended by the American Medical Association, for the convenience of its members. In Illinois, Ohio and Michigan the State medical societies have well worked-out programs for popularizing the procedure and giving their own membership a more concrete idea of how to make and record such examinations. And so the story might be told of many other States.

But in Massachusetts, what has been done? The President of the State Medical Society appointed a committee which did a most excellent piece of work in indicating the need of such examinations, their scope, the type of blank that can be advantageously used—and that seems to be all.

Is the Massachusetts Medical Society's state of coma to continue or can some real progressive action be looked for? The answer lies in the hands of the members of the organized medical societies of the State. It is for them to demonstrate whether Massachusetts is to have a place among the leaders in this program of health conservation or wait until spurred to tardy awakening by the realization that the rest of the country has left this State far in the rear and furnished the proponents of "State Medicine" in its extreme form one more real excuse for existence.

"Periodic physical examinations" is today's

golden opportunity for the medical profession. To ignore it, to half-heartedly accept it, is indefensible neglect.

THE RESPONSE OF THE PUBLIC TO CANCER EDUCATION

THE report of the Commission on Cancer of the Pennsylvania Medical Society* brings to light some interesting statistics regarding the effect of education on the attitude of the public towards cancer. In 1910-11 a survey was made to determine how much time elapsed between the appearance of the first symptoms and the patient's first effort to seek adequate treatment, and between the first visit to a physician and the institution of radical treatment. A similar survey was made in 1923. Comparison of the results of these surveys shows that the extent of delay before seeking treatment has decreased considerably, and that the delay before instituting treatment has diminished even more. The average of delay on the part of the physician has been maintained at what is obviously still much too great a figure by about 10% of the physicians consulted. The advice given by this portion of the medical profession has demonstrated either dense ignorance or gross malpractice on the part of certain practitioners—men, it is alleged, who "never go to medical meetings and never read the journals."

The Committee concludes that lectures to the public are chiefly responsible for the increased attention paid by laymen to early signs of trouble, and that more effort should be expended in spreading information by this means. It advises also the establishment of a cancer division in the State Health Department Clinic. Such clinics would largely eliminate the pernicious influence of the Backward Ten Per Cent. in the medical profession, and would be particularly useful in giving to poor people an opportunity for early investigation of symptoms of possible malignancy.

*Atlantic Medical Journal, September, 1924.

THE TOLL OF THE AUTOMOBILE

IN view of the increasing toll of human lives exacted by the speed mania, amounting to 9,500 for the first seven months of 1924—greater than those taken by typhoid fever, and nearly as great as by influenza—it is interesting to learn of the inroads that are being made on the population of the lower form of vertebrate life by the same destructive agent.

Dayton Stoner of the University of Iowa reports in *Science* the results of a motor trip of 632 miles taken from Iowa City to West Lake Okoboji and return. Noting at the start of the trip the number of dead animals lying by the roadside, apparently the victims of passing motorists, it was decided to keep as accurate an ac-

count as possible of the number of freshly killed carcasses encountered, presumably slaughtered by automobiles.

The record was rather appalling, for in all 225 individual animals, representing 29 species, were counted. Of these there were 6 species of reptiles, 14 species of birds, and 9 species of animals. Red-headed woodpeckers led the list with a total of 53 individual birds thus slain.

When we consider that this number of animal victims was counted on only one trip over only 632 miles of the highways of North America, we can arrive at some idea of what must be the annual toll for the whole country.

LEGISLATIVE NOTES

HOUSE BILL 737

Hearing February 10: President Bigelow attended this hearing. Although there was uncertainty in the minds of some doctors as to the intent of the petitioner, when Mr. Peters spoke in favor of the bill and showed that it would give added freedom to the injured employee in his selection of a physician, doubt was dispelled. Mr. Joseph A. Parks, a member of the Industrial Accident Board, assured Dr. Bigelow that there is nothing in the bill which would be inimical to the interests of physicians.

SENATE BILL 19

The hearing on the bill to legalize chiropractic and the creation of a chiropractic board was conducted February 11.

The lawyer for the chiropractors argued first that they are not practicing medicine and have no relation to the ordinary work of the doctor but since they are accomplishing great good they should be given state endorsement and freedom from prosecution.

Subsequent testimony by several chiropractors tended to make the opening argument ridiculous for these men didn't want this excellent opportunity for staging an advertising campaign to be lost and recounted hundreds of cases of pneumonia and other diseases. The explanation of the causes of such diseases as appendicitis, urinary calculi and many others was grotesque to say the least, and the claim that appendicitis could be cured quickly, early and pleasantly by spinal adjustment was evidently too much for the credulity of the committee. The lawyer was evidently quite taken aback by the wild ranting of his clients.

Dr. E. H. Bigelow filed a protest in behalf of the joint committee of the two medical societies and Dr. C. E. Mongan made a logical and powerful plea for one standard for medical education and practice and showed the inconsistency of the claims of the proponents.

Dr. W. P. Bowers of the *Medical Journal* also

spoke referring to the decision of the Supreme Court relating to chiropractic and to the danger of delay in cases of strangulated hernia when the patient might become incurable under a few hours of chiropractic treatment, because, as was stated by one practitioner, it was only necessary to manipulate the spine in a certain place when there is pain in the lower region of the abdomen.

Members of the committee showed definite interest in the claims submitted by the chiropractors and asked questions which brought out the inconsistencies of the theories and claims submitted.

HEARING ON SENATE BILL 266 BEFORE THE COMMITTEE ON STATE ADMINISTRATION—FEBRUARY 12, 1925

This bill provides for a special Board of Registration for osteopaths; indicates how they shall be appointed and for what terms. It specifies how application shall be made for the examination, but calls for no evidence of previous education. Applicants must be 21 or over and of good moral character. No indication is offered as to what he must have studied in the School of Osteopathy or how long he must spend in acquiring anything he does get.

Their registrants are to have the right to sign birth and death certificates and are expected to conform to all state and municipal public health regulations obtaining for practitioners of medicine.

The petition was presented by the Dean of the Osteopathic College and supported by the President of the College and two other speakers, one a lawyer, and the other an osteopathic student.

The ostensible reason for the introduction of the bill was a desire for a separate Board. The real reason was that they fear absorption of the "osteopathic" profession by the medical profession. They look upon the proposals of Senate Bill 19 as inimical to their existence. They expressed regret to be obliged even to think of a Referendum to the voters of the State but announced their determination to resort to this extreme measure if Senate Bill 226 was not passed.

A good deal of time was taken up by one of the speakers in reporting cures where the medical profession had failed.

The proponent was as sure as ever that the American Medical Association was out to kill the osteopathic cult and that this Recess Committee report was the latest revelation of their determined purpose.

The room was packed with students of the Osteopathic School. Only one citizen, aside from the osteopaths, spoke in favor of the bill. This he did out of loyalty to those whom he thought had saved his life.

The Committee on Medical Education of the

Massachusetts Medical Society and the Massachusetts Homeopathic Medical Society opposed the bill on the ground that a single standard Registration Board would secure the greatest uniformity of registered professional medical skill for the State. Also, it was pointed out that Senate Bill 226 was a distinct retrogression from standards which we have been so long securing, standards which the osteopaths themselves have helped to secure and now urge the necessity of. In this bill, however, there is an absolute abandonment of any security that they would even approximate the present day standards of the Medical Practice Act under which they are now registered. Indeed, no school education is specified as an educational requirement before beginning the study of osteopathy.

The proponents, in response to interrogation from members of the Committee, expressed themselves as entirely satisfied with present registration conditions but fear that there is a "nigger in the woodpile" which prompts their present attitude.

HEARINGS BEFORE THE BOARD OF REGISTRATION IN MEDICINE

At the hearings given February 12 the case of Stanislaus D. Bellehumeur of Lowell was placed on file. The evidence produced showed that the case was apparently a "frame-up." When it was heard in Court, he pleaded "nolo" on advice of his counsel.

The registration of Terrence T. Kinlin of Lowell was suspended for six months for violation of the Narcotic Drug Act.

The registration of Dr. Thomas W. Leavitt of Malden was suspended for one year for violation of the Prohibition Law.

MISCELLANY

THE NEW YORK CITY DEPARTMENT OF HEALTH INAUGURATES A SPECIAL NEUROLOGICAL STUDY

THE Commissioner of Health called together a small group of neurologists, pediatricists and public health experts, on January 7th, 1925, and requested them to constitute themselves a Research Committee to study epidemiological, diagnostic, clinical and therapeutic data, with relation to such diseases of the nervous system as acute anterior poliomyelitis, encephalitis lethargica and meningococcus meningitis. This investigation is to comprise a study of the data that have been accumulated in this and other cities and countries, with a view to furnishing a body of facts that will be of service in indicating the possible advances that can be made from a clinical and public health view, in the control, diagnosis and treatment of these diseases.

The committee designated by the Commissioner is made up as follows:

Charles L. Dana, M. D., Chairman; W. W. Browning, M.D., Dever S. Byard, M.D., E. H. Lewinski-Corwin, Ph.D., Louis I. Harris, M.D., Howard Mason, M.D., William H. Park, M.D., Frederick Tilney, M.D., E. G. Zabriskie, M.D., Frank J. Moaghan, M.D., Ex-Officio.

The committee was formally organized and Dr. Charles L. Dana was elected chairman. This Research Committee will hold frequent meetings at the Academy of Medicine, to plan a program for the study and the compilation of the results of such investigation.

DEATH RATES OF MOTHERS FROM CHILDBIRTH, 1923

THE Department of Commerce announces slightly higher death rates of mothers from childbirth or puerperal causes in 1923 than in 1922.

For the 10 States and the District of Columbia (constituting the "Birth Registration Area" of 1915) the death rate from puerperal causes in 1923 was 6.4 per 1,000 live births as compared with 6.2 in 1922, 6.5 in 1921, and 6.1 in 1915.

Of the 30 States for which figures are available for 1923 and 1922, 14 show higher rates from puerperal causes in 1923. For 1923 the highest rate for white persons appears for South Carolina (7.4), and the lowest (5.4) for both Kentucky and Maryland; whereas for the colored the highest rate (15.4) is for Kentucky, and the lowest (8.3) for Maryland.

Death rates from puerperal causes per 1,000 live births in 1923 for the New England States were as follows: Maine 8.7, New Hampshire 7.4, Vermont 7.0, Rhode Island 6.3, Massachusetts 6.3 and Connecticut 5.7.

The death rates from puerperal septicemia in the same states were: Rhode Island 2.4, Connecticut 2.1, Massachusetts 2.0, Maine 1.8, New Hampshire 1.6 and Vermont 1.5.

THE TYPHOID EPIDEMIC

AN epidemic of typhoid of unknown source and with cases confined largely to the homes of the wealthy and to persons over fifteen years of age is spreading over the country, and has reached serious proportions in New York, Chicago, Pittsburgh and Washington. These facts, according to *Science News*, relieve milk and water supplies of any suspicion of taint. Public suspicion is directed toward oysters as the cause, and the sales of oysters have fallen off one-half. In Chicago a twenty-five dollar fine has been imposed for eating raw oysters, and they are banned in New York and Pennsylvania.

According to the latest Public Health Service data typhoid fever is now nearly four times as prevalent as in normal times, one hundred and

five cities having reported 197 cases for the last week of December, 1924, as against 54 for the same week in 1923.

PARATHYROIDS IN RACHITIC CHILDREN

L. P. DOYLE, of The Purdue University Agricultural Experiment Station, finds enlargement of the parathyroid glands occurring with great constancy in truly rachitic children, according to *Science*. Other investigators, notably Erdheim, Ritter and Pappenheimer and Minor claim to have found this same enlargement in rachitic rats and human beings.

RECENT DEATHS

BRICKETT.—DR. GEORGE H. BRICKETT, surgeon of Augusta, Me., died at the Margaret Mary Home in Cheshire, Mass., of cardio-renal disease, February 1, 1925, at the age of 64.

Born in China, Me., September 6, 1860, he was a student at Bowdoin Medical School in 1884, taking his M.D. at Bellevue Hospital Medical College, New York, the following year. He practised in Augusta, but for several years had been surgeon, first on United Fruit Company steamers and later on those of the Red Star Line. A sister, Mrs. Henry S. Blaisdell of Pittsfield, survives him.

CARLETON.—DR. ELIZABETH ABBOTT CARLETON, founder of the Home for Aged Couples, Walnut and Columbus Avenues, Roxbury, and its president since its inception, died January 28, 1925, at the home. She was 96 years old.

Mrs. Carleton was married when quite young to Dr. Charles Carleton, who died soon after the marriage. After his death Mrs. Carleton traveled, studying in London, Paris and Vienna. Returning to Boston, she studied medicine at Boston University and there received her medical degree in 1872, beginning the practice of medicine.

In 1883 Mrs. Carleton developed a plan of founding a home for aged couples. She formed a society to promote the plan. The society was incorporated in 1884, after much money had been raised, and the building at 431 Shawmut Avenue was purchased. After three years in that home the property at the junction of Walnut Avenue and Columbus Avenue was bought and new buildings were from time to time constructed. Mrs. Carleton was reelected president year after year, and at the last annual meeting of the directors read her fortieth report. She lived for many years at 30 Union Park, moving out to the home only recently.

HUDNUT.—DR. PAUL ALBERT HUDNUT, secretary and treasurer of the Hampshire District Medical Society, died following a major operation for malignant disease of the stomach in New York City, January 24, 1925, at the age of 56.

Born in Brooklyn, N. Y., on November 22, 1868, he was the third son of Alexander and Maria Parker Hudnut of Black Heath, England. His early education was received in England, his medical training at Harvard Medical School, where he was graduated in the class of 1898. He first practised in Pawtucket, R. I., and later in Wellesley, Mass., where he married Mrs. Helen Tracy Newbold in 1909. He went to Hampshire County late in 1910 and practised in Chesterfield for four years. In 1915 Dr. Hudnut moved to Northampton, where he resided until his death.

He was house physician of the Children's Aid Association of Hampshire County, secretary of the Northampton Amateur Players, and was a member of the Cooley Dickinson Hospital Medical Association, the Northampton Club and the Northampton Country Club. A short time before his death Dr. Hudnut became a member of the Unitarian church.

He is survived by his wife, Helen Tracy Hudnut, her children, Douglas T. Newbold of New York City and Katherine F. R. Newbold of Northampton; by his mother, Mrs. M. L. Hudnut; by his brothers, one of them being Dr. Frank P. Hudnut of New Bedford, a Fellow of the Massachusetts Medical Society, and by a sister, who lives in New York.

ADAMIAN.—DR. PARNAG ADAM ADAMIAN died at Worcester, February 3, 1925, of pneumonia, at the age of 56.

He was a native of Armenia but came to the United States in 1897, and, after studying theology in Yale and Cambridge Theological School, he entered Harvard Medical School, where he was a graduate in 1906. He practised medicine in Boston from 1906 until 1912, when he went to Worcester. For the past 15 years he had been chairman of the Central Committee of the Armenian Church in the United States.

He was professor of pathology and bacteriology in the College of Physicians and Surgeons, Boston, and a Fellow of the Massachusetts Medical Society.

OBITUARIES

ROBERT WILLIAMSON LOVETT

1859-1924*

IN the passing of Robert W. Lovett, this Society has lost one of its founders, one of its ex-Presidents, one of its most loyal supporters. Moreover, our profession has lost a devoted servant, the cripple a devoted friend.

Those who have seen Lovett in the wards of the Children's Hospital among his charity patients have possibly known him at his best. His unfailing courtesy to his co-workers and all with whom he came in contact was only exceeded by his patience with and tenderness toward his charges, "All ye loves."

His erect and spare figure, his abundant head of hair, closely cropped and scarcely touched with silver, his appearance of being always well groomed, belied the fact of his years. For these when counted take him back to the relatively early days of orthopaedics—a specialty which may be considered to have attained its adolescence, if it did not actually have its birth, here in Boston.

On his graduation from the Medical School in 1885, he served as a house officer at the City Hospital; and there subsequently, as a member of the surgical staff, he had, until 1899, a long apprenticeship in general surgery before devoting himself exclusively to the special work which particularly appealed to him. He thereby avoided the most dangerous pitfall of specialization, and held always a broad and undistort-

ed view of the relation of his own work to that of general medicine and surgery.

During the twenty-five years which followed, he saw orthopaedics grow from a struggling specialty within surgery to the position of a full-blown, independent department. And the importance of a department is the best measure we may have of the stature of the man who develops it. In short, it is not the subject but the man who makes a special field of work loom large in his particular day.

By instinct an aristocrat and not a man given over to ready intimacies, those who came to hold Lovett close found him unfailing in that greatest of qualities, loyalty in friendship. Among those friends were many of the leaders of orthopaedic progress in both Europe and America, whatever their school of thought might be. His open mind was not one to be led astray by the professional foibles and questions of the day. He steered a safe course between the *Blutung* and the *Unblutung* methods which for long represented the rocks whence thundered the guns of contending factions in orthopaedics. His personal tastes inclined him rather toward the non-operative school and to the study of such difficult problems as involved in the correction of spinal deformities; but this personal slant by no means coloured his clinic nor hampered his junior associates in their predilection for open methods of treatment, many of which were devised and perfected under his encouragement and guidance.

Lovett's contributions to the literature of his subject were many and in later years dealt largely with infantile paralysis. Perhaps of all his writings the two text books in which he collaborated are best known. He was not only a lucid writer but was always an inspiring teacher of undergraduates. And those who after graduation came as pupils to profit by more intimate contact with him could hardly have found a guide or counsellor more considerate or more loyal to their interests.

Though gentleness and patience were qualities essential for his art, beneath his quiet and dignified demeanor lay an enthusiasm easily aroused to undertake and carry through large projects. His training was not such as to take him to the laboratory, and the outlet for his energies lay rather in public service. It was in this spirit that he took over the Chairmanship of the Commission on Infantile Paralysis and organized the work which has led to the recently published volume based on the detailed studies of the epidemics in Vermont. It was in the same spirit that during the war he gave himself over to the training in orthopaedics of medical officers.

That, in his quiet way, he possessed unusual gifts for administration is shown not only by the way these pieces of work were organized and carried through, but also by the perfection of his smoothly running clinic and the conduct of

*Being the transcript of a minute adopted by the Boston Surgical Society, July 2, 1924.

his office practice, for he was a man widely consulted and one whose opinion was cherished.

His qualities made him an ideal faculty colleague. He had a constructive type of mind, yet with a gentle tolerance of ideas which opposed his own. He could see both sides of a question, was most considerate of the feelings of others, spoke no ill, was a stranger to gossip, and had a kindly charity toward the frailties of mankind.

We thus may bring to mind some of the characteristics of the dependable friend and colleague we have lost. The School, his hospital, this Society are not the same without him. But the inspiration of his example remains.

"Men perish but man shall endure; lives die, but the life is not dead."

Aware that he was the victim of advanced arteriosclerosis, he preferred to continue as though personal ill health did not exist. He had planned to spend the summer abroad with his family. It was apparent on the steamer that he had overtaxed himself and his end was probably near. He had no fears. He died a few days after landing at the home of his devoted friend of many years, the Nestor of orthopaedics in Great Britain.

Robert Lovett was the last of his name; the only son of John Dyson and Mary Williamson Lovett of Beverly, Massachusetts. He is survived by his wife, his married daughter and only child, and her three children. To them in their bereavement the sympathies of the members of this Society are extended while inscribing this memorial note as a minute on the pages of our records.

REPORTS AND NOTICES OF MEETINGS

A PHYSIOLOGICAL CONFERENCE will be held Wednesday, February 25, in the Bowditch Library, Harvard Medical School, Building C, at 4 P. M. Dr. Lazlo Reiner will speak on "Migration Velocity of Some Proteins."

SPRINGFIELD ACADEMY OF MEDICINE

THE regular meeting of the Springfield Academy of Medicine was held at 137½ State St. on Tuesday evening, February 10, at 8.30 o'clock. Dr. James Z. Naurison presented a cardiac case. Dr. Paul D. White of Boston spoke on: "Cardiac Diseases and Prognosis."

The discussion was opened by Dr. Everett A. Bates and Dr. William C. Leary. General discussion followed.

HARVARD MEDICAL SOCIETY

THE next regular meeting of the Harvard Medical Society will be held as usual in the amphitheatre of the Peter Bent Brigham Hospital,

Feb. 24, 1925, at 8:15 P. M. The program follows:—

1. Demonstration of cases.
2. Some New Phases of Metabolism Technique. Francis G. Benedict.
3. The Determination of Biliary System Function. Dr. Wm. P. Murphy.

All members of the Medical Profession, Medical Students and Nurses are invited.

Very sincerely yours,

DR. S. A. LEVINE.

N. E. ROENTGEN RAY SOCIETY

THE next meeting of the N. E. Roentgen Ray Society will be held February 20 at 8 P. M. in the lower Out-patient Amphitheatre of the Massachusetts General Hospital.

The papers are as follows:

1. Malignancy Complicating Osteitis Deformans. Dr. John D. Camp.
2. Value of Prophylactic X-Ray Treatment in Cases of Carcinoma of the Breast. Dr. Robert B. Greenough.
3. Some Observations on the Technic and Value of High Voltage X-Ray Therapy. Dr. Richard Dresser.
4. Remarks on Diagnostic Technic. Dr. G. W. Holmes.

Case Reports by Members of the Staff.

The profession is invited to attend.

DR. FRANK E. WHEATLEY, *Secretary*.

MEETING OF THE NORFOLK DISTRICT MEDICAL SOCIETY

A REGULAR meeting of the Norfolk District Medical Society will be held in Roxbury Masonic Temple, 171 Warren St., Roxbury, February 24, 1925. Tel. Roxbury 6089. Communication: Periodic Physical Examinations, Drs. Roger I. Lee and Francis H. McCrudden. Discussion. Collation.

FRANK S. CRUICKSHANK, M. D., *Sec.*

NOTICES FROM THE HARVARD SCHOOL OF PUBLIC HEALTH

THE following lectures will be given at the Harvard Medical School, amphitheatre building E, by Dr. W. G. Smillie, senior state director of the International Health Board of the Rockefeller Foundation:

February 24, 3 P. M. "The Organization of County Health Units in the South."

February 26, 3 P. M. "Recent Advances in the Epidemiology of Malaria."

February 27, 3 P. M. "The Epidemiology of Hookworm and Organization of Methods of Control."

Dr. Rankin's lecture scheduled for February 13 had to be postponed because the train was delayed.

MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH

THE Annual Meeting of the Massachusetts Association of Boards of Health was held at the 20th Century Club, 4 Joy St., Boston, on January 29, 1925, and was well attended.

The following officers were elected: President, F. P. Denny, M. D., of Brookline; 1st Vice President, J. J. McGrath of Salem; 2d Vice President, M. V. Safford, M. D., of Boston; Secretary, W. H. Allen, M. D., of Mansfield; Treasurer, F. G. Curtis, M. D., of Newton.

Dr. George H. Bigelow, Director of the Division of Communicable Diseases of the Massachusetts Department of Public Health, and Dr. C. Morton Smith, Clinical Professor of Syphilis of the Harvard Medical School, spoke on "The Control of Venereal Disease. How and to Whom Shall Cases of Gonorrhoea and Syphilis Be Reported?"

A lively discussion of these papers was opened by Dr. Eugene R. Kelley, Dr. Francis X. Mahoney and Dr. Francis G. Curtis.

There was so much interest in the subject presented that it was decided to continue the discussion at the next meeting to be held April 23, 1925.

MEETING OF THE HARVARD MEDICAL SOCIETY

THE Harvard Medical Society met at the Peter Bent Brigham Hospital on Tuesday evening, Feb. 10th.

Three cases were demonstrated.

(1) A man of thirty-nine with an infection of the kidney. He had a history of gonorrhoea and had previously been operated upon for removal of a calculus from the pelvis of the right kidney. By catheterization, the right kidney was found to be excreting very little urine, although free from infection, whereas the left organ was infected.

(2) A man, sixty-one years of age, with an aneurysm of the aorta. Previous to entry, his condition had been diagnosed as carcinoma of the prostate with a metastasis to the spine. This erroneous diagnosis was suggested by the nodular character of the prostate and the pain in the back which the patient complained of.

(3) A man with chronic lead poisoning. He had worked for a number of years with a concern that salvaged metals. Two weeks previous to entry he began to have attacks of dull aching pains in the lower abdomen. This distress was aggravated by eating and relieved by defecation and by pressure on the abdomen. Physical examination revealed a marked lead line on the gums. He was placed on a soft solid and liquid diet and given magnesium sulfate and calcium chloride. Tincture of belladonna was administered for relief of the pain. Later all foods

with a high calcium content were withheld and ammonium chloride was given to increase the excretion of lead. This change produced a slight recurrence of symptoms, presumably from extensive liberation and excretion of the lead through the intestine.

Dr. W. C. Quinby spoke on "The Present Day Trend in the Treatment of Kidney Infections." He reviewed the various means and types of infection of the kidney. It is well known that even the normal kidney will allow viable organisms to pass through it. The bacilli of typhoid and tuberculosis appear in the urine in these diseases. Colon bacilli may occur in the urine during an attack of appendicitis.

Organisms that reach the kidney must come from some focus of infection, elsewhere in the body. Usually they reach the kidney from such foci by way of the blood stream. They may also arrive there by way of the lumen of the excretory passages. This happens more frequently with an infection in the lower urinary passages but may occur without it. There is evidence that the lymphatics passing from the intestine to the kidney may carry organisms. Cases of pyelitis are often associated with constipation. This condition in the bowel would favor a spread of infection by the lymphatics.

The paramount infection of the urinary tract is with one or another of the colon bacilli. It is always more extensive than the pelvis and ureter. The mucosa and submucosa are attached. If the infection is severe and lasting, microscopic changes may occur. First a blunting of the colyces will be noted in the X-ray picture. Later the ureters become extremely dilated and increased in length. The end result is extensive destruction of the tissue, a condition impossible to ameliorate. Dr. Quinby illustrated these changes with lantern slides of pyelograms from severe cases.

Little can be said about the predisposing causes of infection. The general principles of immunity are operative here and elsewhere. Infection presumably occurs when there is an overwhelming virulence of the invading organism. Often infection is associated with some structural abnormality.

Various antiseptics have been tried against these infections. Urotropine has been shown to be of little or no value for infections as high in the excretory passages as the kidney. It is given today more by habit than by logic. Silver nitrate introduced by lavage sometimes produces a cure in mild infections. In many instances it is ineffective. It acts as a chemical irritant only. Desquamation follows its use. Its antiseptics is probably due to the hyperemia which accompanies the healing process.

Treatment by lavage can only be intermittent as it is so uncomfortable for the patient. An effective urinary antiseptic must be introduced in some other way. The ideal drug should be chemically stable, non-toxic, non-irritant and

capable of exerting antiseptic action in great dilution in either an acid or an alkaline medium. Besides it should be excreted rapidly by the kidney.

As yet no drug having the proper qualifications has been found. An extensive investigation in search of such a substance was recently carried out in Baltimore. The result was the production of mercurochrome. It has good antiseptic properties but being a mercury compound is somewhat toxic. It was found that it could be administered intravenously with a fair degree of safety. A few cases were greatly benefited. Later it was used by mouth, perhaps with more safety. The administration of this drug has produced marked curative effects in such skin lesions as psoriasis. The value of mercurochrome is still uncertain however. All the toxic symptoms of mercurialism follow its extended use, although no definite signs of nephritis have been noted.

Another substance of an entirely different nature is being investigated under the auspices of the National Research Council. This is hexaresoreinol. It is non-toxic and has very strong bactericidal properties, its phenol coefficient being forty-six. It fulfills most of the requirements of an ideal urinary antiseptic. There has been considerable difficulty in producing it in a stable and non-irritant form. At first it was prepared for use in salol-coated tablets but now it is dispensed in oily solution in a gelatin capsule.

The chief drawback to the use of hexaresoreinol is the marked cathartic effect produced by the first few doses. On account of this effect, it is often difficult to persuade a patient to continue the treatment. The clinical results of its use are by no means constant. It clears up staphylococcus infections with marked success, but such infections are rare in the kidney. In kidneys infected with a colon bacillus the symptoms are always allayed.

Neither mercurochrome nor hexaresoreinol is likely to be the final choice of a urinary antiseptic, but some substance will be found that will be usable. At the present time Dr. Quinby recommends the following as the best treatment for kidney infections:

- (1) Lavage of kidney (in early cases) with mercurochrome.
- (2) Hexaresoreinol by mouth.
- (3) Frequent changing of the reaction of the urine, especially in children.
- (4) Search for and treatment of the primary source or cause of infection.

Dr. J. C. Aub addressed the meeting on "The Mechanism and Treatment of Lead Poisoning." An investigation on this subject has been carried on at the Harvard School of Public Health during the last three years. Experiments on the absorption and distribution of lead in the body proved that the metal can be absorbed from the nasal mucosa and that it is more readily ab-

sorbed from the lungs than from the intestine. Four hours after an injection of lead, half of it may be recovered from the liver, the remainder is distributed throughout the body. After absorption has entirely ceased, almost all the lead may be found in the bones.

The fact that lead is at first distributed to various tissues and later is found in the bones has an important bearing on medico-legal cases, where lead poisoning is suspected. The distribution of the lead determines whether the lead has been absorbed gradually over a long period or all at one time.

The pathological changes due to lead poisoning are comparatively slight. Very little, if any, change can be detected in the appearance of the cells. The study of functional variations has thrown more light on the effects of lead.

Red cells exposed to lead are found to be less permeable, also less elastic and more fragile. They show an inability to swell by absorption of water. They also exhibit a change in viscosity. They cannot agglutinate as normal cells do and are more easily hemolyzed. These effects are produced in vivo as well as in vitro, but are less marked in cases of chronic poisoning. Anaemia of lead poisoning may then be explained by the action of the metal on the surface of the red cells.

In a study of the effect of lead on muscle, it was found that it causes a tremendous increase in phosphate excretion by the muscle. The excretion of phosphate is dependent on the permeability of the muscle cells. Lead renders these cells more permeable and a greater quantity of phosphate escapes. Associated with this is a more rapid fatigue of the muscle. This early onset of fatigue is readily observed in an animal poisoned with lead. Investigations on lead palsy show that there is a marked generalized weakness of the muscles before the palsy begins. It would seem from this that the palsy is in part a muscular phenomenon rather than entirely one of nervous origin.

In treatment of lead poisoning, the question arises as to the advisability of leaving the absorbed lead in the bones rather than of forcing its excretion. It seems impracticable to attempt to get rid of all the lead, for even under most favorable conditions it is a slow process. It is desirable, however, to get the body free of the easily mobilized lead. The longer lead remains in the body, the less easily it is mobilized and excreted. Treatment with any of the various salts that promote lead excretion, combined with a low calcium diet, has been found most effective. Potassium iodide, phosphoric acid, ammonium iodide and a number of other salts undoubtedly increase the excretion. Prolonged treatment of this kind is not advisable as the lead is excreted in smaller and smaller quantities as time goes on. After the easily mobilized lead is gotten rid of, the patient should be placed on a high milk diet and this maintained indefinitely. The metabolism of lead is similar to that of cal-

cium. One substance influences the distribution and excretion of the other. The lead is kept in the bone by the calcium of the milk diet, and in that tissue it seems to do no harm.

SOCIETY MEETINGS

- Essex North District Medical Society*
May 6, 1925. Annual meeting at Lawrence.
- Franklin District Medical Society*
The meetings of the Franklin District Medical Society will be held on the second Tuesday of March and May.
- Hampden District Medical Society*
Meeting to be held on the third Tuesday in April.
- Hampshire District Medical Society*
The meetings will be held the second Wednesday of March and May.
- Middlesex East District Medical Society*
Wednesday, March 18. Harvard Club. Dr. John H. Cunningham. "Urinary Retention: Its Significance and Treatment."
Wednesday, April 15. Harvard Club.
Wednesday, May 13. Colonial Inn, North Reading.
- Middlesex North District Medical Society*
April 29, 1925.
- Middlesex South District Medical Society*
Winter Schedule—The plans for winter meetings of the Society include the stated meeting in April, two hospital meetings, and five meetings to be held in conjunction with the Suffolk District Medical Society and the Boston Medical Library (two surgical, two medical, and one general).
- Norfolk District Medical Society*
February 24, 1925. Masonic Temple. Subject: "The Need of Periodical Physical Examinations and How to Make Them." Speaker: Dr. Francis H. McCrudden. A second speaker will be selected to present another subject at this meeting.
March 31, 1925. Tufts College Medical School. This meeting given over to Drs. Leary and Watters for the purpose of giving us a medical examiners' talk.
- Norfolk South District Medical Society*
Meetings will be held the first Thursday of each month to May, inclusive, at 12 noon, at the Norfolk County Hospital, South Braintree.
- Suffolk District Medical Society*
February 25. Surgical Section, in association with the Middlesex South District Medical Society. "Pyelonephritis," Dr. Arthur H. Crobie.
March 25. Medical Section, in association with the Middlesex South District Medical Society. "The Treatment of Pneumonia," Dr. Edwin A. Locke.
April 22. Annual meeting. "Hypertension and Longevity," Dr. Harold M. Frost.
- Worcester District Medical Society*
March 11, 1925. St. Vincent's Hospital, Worcester. Papers will be read by the members of the hospital staff.
April 9, 1925. Subject and speaker to be announced.
May 14, 1925. Annual meeting.

If you desire further information in regard to these meetings write to the Secretaries of the District Medical Societies (listed on page 3 of the Advertising Section). The Massachusetts Medical Society Directory contains their addresses.

BOOK REVIEWS

Operative Surgery. (Volume VI—The Final Volume.) Covering the Operative Technic involved in the operations of general and special surgery. By WARREN STONE BUCKHAM, M.D., F.A.C.S., Former Surgeon in Charge of General Surgery, Manhattan State Hospital, New York; Former Visiting Surgeon to Charity and to Touro Hospitals, New Orleans. In six octavo volumes totaling approximately 5400 pages, with 6378 illustrations, mostly original, and separate Desk Index Volume. Volume VI, completing the set, contains 989 pages, with 1224 illustrations. Philadelphia and London: W. B. Saunders Company, 1924. Cloth, \$10.00 per volume. Sold by subscription only. Index Volume free.

This last volume conforms in excellence to those preceding it and is especially rich in descriptive illustrations, many of which, as in former volumes, are distinctly original. The illustrative descriptions of

technic leave absolutely nothing to be desired. This volume is accompanied by a general index in separate volume. It contains 16 chapters on the following subjects:

- Operations upon the Seminal Vesicles and Ejaculatory Ducts.
- Operations upon the Prostate Gland.
- Operations upon the Female Urethra.
- Operations upon the Female External Generative Organs.
- Operations upon the Vagina, including the Perineum.
- Intravaginal Operations upon the Cervix Uteri and upon the Cavity and Body of the Uterus.
- Operations upon Fistulae Involving the Female Generative Organs.
- Operations upon the Intraperitoneal Female Generative Organs by the Vaginal Route.
- Operations upon the Female Intraperitoneal Organs through the Inguinal Canals.
- Intra-Abdominal Operations upon the Ovaries, Ovarian Ligaments, Fallopian Tubes, and for Intrapelvic Infection.
- Intra-Abdominal Operations upon the Uterus, Round Ligaments, and Broad Ligaments.
- Operations upon the Pregnant Uterus—and its Contents.
- Operations upon the Puerperal Uterus and Vagino-perineum.
- Operations for Ectopic Pregnancy.
- Operations on the Newborn.
- Operations for Deformities and Disabilities Not Included in Preceding Chapters.

General Surgery. By ALBERT J. OCHSNER. The Practical Medicine Series. Comprising eight volumes on the year's progress in medicine and surgery. Volume II, Series 1924. Chicago: The Year Book Publishers.

This valuable little volume of 706 pages, including the index, is typical of the books already published in this series.

This particular volume is divided into—

- (1) Technic in General, which includes anesthesia, analgesia, diathermy, radioactivity, new instruments and apparatus, asepsis and antisepsis, and operative technic.
- (2) Surgical Pathology, which includes wound healing, tetanus, and malignant tumors.
- (3) Blood Vessel, Bone and Nerve Surgery.
- (4) Surgery of the Head and Face.
- (5) The Neck and Thyroid.
- (6) The Mammary and Chest.
- (7) General Abdominal Surgery.
- (8) The Gastrointestinal Canal.
- (9) Liver, Gallbladder, Pancreas, and Spleen.
- (10) The Spine and Extremities.

The author presents a very short introduction briefly summarizing the more recent advances in medicine and surgery, such as the indication that ethylene, a new anesthetic, is safe and compares favorably with nitrous oxide; that local and spinal anesthetics are steadily gaining ground; that radium and X-ray are steadily receiving greater and greater attention in therapeutics; that insulin has revolutionized surgery in diabetes; that greater efforts in studying the etiology of cancer have been put forth in the last year; that blood transfusion has been much more extensively used; that much more attention is given to the surgery of nerves than formerly; and that much progress has been made in treatment of lung abscess.

This volume is very well illustrated, there being many original, hitherto unpublished drawings and pictures. In abdominal surgery many new conditions are described and the operative technic set forth.

This book is of extreme value, small and handy to use, and forms another valuable link in the chain of already published books of this kind.